

**Supplement to the
Hood Canal and Eastern Strait of Juan de Fuca
Summer Chum Salmon Recovery Plan**

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Prepared by

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DISCLAIMER

Under the Endangered Species Act of 1973 (ESA), the goal of a recovery plan is the conservation and survival of a threatened or endangered species. Recovery plans are prepared by the National Marine Fisheries Service (NMFS), consistent with the agency's obligations under the ESA, often with the assistance of recovery teams, contractors, state agencies, and others. Recovery plans are not regulatory or decision documents—that is, the recommendations in a recovery plan are not considered final decisions unless and until they are actually proposed for implementation. Objectives will be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Nothing in this Plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation. Recovery plans do not necessarily represent the views, official positions, or approval of any individuals or agencies, other than those of NMFS, and they represent the official positions of NMFS only after they have been approved by the NMFS Northwest Regional Administrator, after giving notice of a proposed Plan and opportunity for public comment. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery actions.

1.0 INTRODUCTION

The Endangered Species Act of 1973 (ESA) requires the National Marine Fisheries Service (NMFS) to develop recovery plans for species listed under the Act. The purpose of recovery plans is to identify actions needed “for the conservation and survival” [ESA section 4(f)(1)] of threatened and endangered species to the point that they no longer need the Act’s protection. To be approved by NMFS, a recovery plan must meet certain requirements prescribed by the ESA; it must describe specific management actions, establish objective, measurable criteria for delisting, and estimate the time and cost to carry out the measures needed to achieve recovery [listed in ESA section 4(f)(1)(B) and Section 4.0 of this document].

NMFS believes it is critically important to base ESA recovery plans for Pacific salmon on the many state, regional, tribal, local, and private conservation efforts already underway throughout the region. Local support of recovery plans by those whose activities directly affect the listed species, and whose actions will be most affected by recovery requirements, is essential. NMFS’ approach to recovery planning has therefore been to support and participate in locally led collaborative efforts to develop recovery plans, involving local communities, state, tribal, and Federal entities, and other stakeholders.

On November 15, 2005, the Hood Canal Coordinating Council (HCCC), a regional council of governments, presented its locally developed listed species recovery plan (Plan) to NMFS in accordance with technical guidance and delisting criteria (available at <http://www.hccc.wa.gov/SalmonRecovery/default.aspx>). The Plan focuses on the recovery of the Hood Canal summer-run chum salmon evolutionarily significant unit (ESU), which includes summer-run chum salmon populations that naturally spawn in tributaries to Hood Canal as well as in Olympic Peninsula rivers between Hood Canal and Dungeness Bay (FR 64 14508 March 25, 1999). As the lead ESA agency for Hood Canal summer-run chum salmon, NMFS is responsible for reviewing this locally produced recovery plan and deciding whether adoption is merited.

To aid locally developed plans in meeting or contributing to ESA requirements, NMFS writes a “supplement,” summarizing the plan and noting any necessary additions or qualifications. The supplement then becomes part of the ESA recovery plan for the ESU. This document is NMFS’ supplement for the Hood Canal and Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Plan. It contains the following components: the Northwest regional context for the Plan; background and overview of the Plan and its development; a discussion of how the Plan satisfies ESA recovery plan requirements, including qualifications and additional actions that NMFS believes are necessary to support recovery; and a description of NMFS’ intended use of the Plan.

Two other ESA-listed salmonid species, Puget Sound Chinook salmon and Coastal/Puget Sound bull trout, are indigenous to the Hood Canal and eastern Strait of Juan de Fuca regions encompassed by the Plan. The Shared Strategy for Puget Sound, a nonprofit organization that coordinates recovery planning for Puget Sound Chinook, submitted a recovery plan for Puget Sound Chinook salmon to NMFS in June 2005. Coastal/Puget Sound bull trout are under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS), and are the subject of a recovery

plan published by the USFWS in May 2004. These species will not be further discussed in this document.

This Plan was developed with the goal of building on the requirements of five interrelated planning initiatives: (1) ESA recovery planning for salmon; (2) watershed planning pursuant to the Washington Watershed Management Act; (3) habitat protection and restoration pursuant to the Washington Salmon Recovery Act; (4) the Washington State Growth Management Act; and (5) the Summer Chum Salmon Conservation Initiative (SCSCI).

In the case of listed salmon, additional considerations are also important. Hood Canal summer-run chum salmon, and all of the other listed salmonids in other ESUs, have historically been harvested, and there is a strong public interest in restoring their abundance to harvestable levels. Because listed salmon often overlap in migration timing and area with healthy, non-listed fish populations, the listings not only constrain the harvest of listed fish but also have become factors limiting the harvest of other non-listed fish.

Northwest Indian tribes have legally enforceable treaty rights reserving to them a share of the salmon harvest. Achieving the basic purpose of the ESA (to bring the species to the point where it no longer needs the protection of the Act) may not by itself fully meet these rights and expectations, although it will lead to major improvements in the current situation. Ensuring a sufficient abundance of salmon to sustain harvest can be an important element in fulfilling trust and treaty rights as well as garnering public support for these plans.

Thus, it is appropriate for recovery plans to take these considerations into account and plan for a recovery strategy that includes harvest. In some cases, the desired abundances made available for harvest may originate from increases in the natural-origin salmon population. In others, the recovery strategy may include appropriate use of hatcheries to support a portion of the harvest. So long as the overall plan is likely to achieve the ESA-defined recovery of the listed ESU, it will be acceptable to NMFS as a recovery plan.

After review comparing the Plan's contents to ESA requirements, NMFS has concluded that the Hood Canal Coordinating Council's Hood Canal Summer Chum Salmon Recovery Plan, with the addition of enhancements identified in this Supplement, meets ESA section 4(f) recovery plan requirements.

2.0 NMFS NORTHWEST REGIONAL CONTEXT FOR THE PLAN

As part of its salmon recovery planning efforts, NMFS Northwest Region designated five geographically based "recovery domains" in the Pacific Northwest. Hood Canal and the Eastern Strait of Juan de Fuca are considered part of the Puget Sound recovery domain, which encompasses recovery planning initiatives for the listed Hood Canal summer chum, Puget Sound Chinook, and Ozette Lake sockeye salmon ESUs. The other recovery domains are the Willamette/Lower Columbia, Interior Columbia, Oregon Coast, and Southern/Oregon Northern California Coast. For each domain, NMFS convened an independent Technical Recovery Team (TRT) to develop recommendations on biological viability criteria for the ESU and its component populations, to make technical findings regarding limiting factors, to provide scientific support to local and regional recovery planning efforts, and to provide scientific

evaluations of proposed recovery plans. The Puget Sound TRT (PSTRT) includes biologists from NMFS, state, tribal, and local agencies.

NMFS' intent in establishing TRTs for each domain was to seek unique geographic and species expertise and to develop a solid scientific foundation for the recovery plans. All the TRTs used the same biological principles for developing their ESU and population viability criteria. These principles are described in a NMFS technical memorandum, *Viable Salmon Populations and the Recovery of Evolutionarily Significant Units* (McElhany et al. 2000). Viable salmonid populations (VSP) are defined in terms of four parameters: abundance, population productivity or growth rate, population spatial structure, and life history, genetic, and ecological diversity. A viable ESU is naturally self-sustaining with a high probability of persistence over a 100-year time period. Each TRT made recommendations using the VSP framework and based on data availability, the unique biological characteristics of the ESUs and habitats in the domain, and the members' collective experience and expertise. Although NMFS has encouraged the TRTs to develop regionally specific approaches for evaluating viability and identifying factors limiting recovery, each TRT is working from a common scientific foundation to ensure that the recovery plans are scientifically sound and based on consistent biological principles.

In each domain, NMFS is also working with state, tribal, local and other Federal stakeholders to develop a planning forum appropriate to the domain that builds to the extent possible on ongoing, locally led efforts. The role of these planning forums is to use the TRT reports and other technical products to agree on recovery goals and limiting factors assessments, then develop locally appropriate and locally supported recovery actions needed to achieve recovery goals. While these forums also are working from a consistent set of assumptions regarding needed recovery plan elements, the process by which they develop those elements, and the form they take, may differ among domains. In the case of the Hood Canal summer chum, a local planning forum – the Hood Canal Coordinating Council – was already in existence and well prepared to take on the task of developing a recovery plan.

In 2005, in addition to the Hood Canal Coordinating Council's Summer Chum Plan and the Shared Strategy Salmon Recovery Plan for Puget Sound Chinook salmon, NMFS received locally developed recovery plans for listed salmon and steelhead from the Upper Columbia Salmon Recovery Board, the Washington Snake River Salmon Recovery Board, and the Yakima Subbasin Recovery Board. An additional draft recovery plan for the Lake Ozette sockeye salmon ESU is expected to be submitted to NMFS in December 2006. NMFS is also working with the states of Oregon and Idaho to draft regional recovery plans for listed salmon ESUs within their respective recovery domains for submittal by December 2006. As draft plans are completed, NMFS will make them available for public review and comment.

3.0 BACKGROUND AND OVERVIEW OF THE PLAN

The Hood Canal Coordinating Council is a watershed-based council of governments that was established in 1985 in response to concerns about water quality problems and related natural resource issues in the watershed. It was incorporated in 2000 as a 501(c)3, Public Benefit Corporation under RCW 24.03. Its board of directors includes the county commissioners from Jefferson, Kitsap, and Mason counties, and elected tribal council members from the Skokomish and Port Gamble S’Klallam Tribes. It also includes a slate of ex-officio board members composed of representatives from state and federal agencies. The HCCC also has “cooperating partners” (e.g., volunteer groups, regional fisheries enhancement groups, conservation districts, and land trusts) who work collaboratively with the Council on various projects and programs. The HCCC has two missions, one with respect to Hood Canal itself and the other pertaining to Hood Canal salmon, as follows:

The Hood Canal Coordinating Council recognizes Hood Canal as a national treasure and will advocate and implement locally appropriate actions to protect and enhance the Canal’s special qualities. (Adopted in 1992)

To assure the existence of wild salmon in Hood Canal for the next 150 years, the Hood Canal Coordinating Council will: understand the causes of the decline of salmon in the Canal; identify the values and choices to be made in the natural, economic, legal, social, and cultural environments of salmon; develop and choose appropriate responses; and implement actions to maintain natural populations of salmon stocks at self-sustaining levels for ceremonial, subsistence, recreational and commercial fisheries. (Adopted in 1996)

The State of Washington published its *Statewide Strategy to Recover Salmon: Extinction is Not an Option* in 1999 and subsequently identified seven salmon recovery regions, of which Puget Sound (including Hood Canal) is one. The State of Washington designated HCCC as the Lead Entity for the Hood Canal watershed, and, in 2005, as the regional recovery organization for Hood Canal summer chum.

The range of the Hood Canal/Eastern Strait of Juan de Fuca summer chum salmon ESU encompasses four counties: Mason, Jefferson, Kitsap, and the eastern portion of Clallam. Under Washington State law, counties have considerable land use authority that can affect summer chum salmon habitat. As a Lead Entity under the authority of RCW 77.85, the HCCC is charged with coordinating salmon recovery projects among the various jurisdictions and groups in the watershed. The HCCC specifically intends its plan to be useful at the local level, and to provide information that will help the counties “manage their respective regulatory programs in a manner that is consistent with summer chum salmon recovery.” The HCCC further states that its plan “will provide a logic and rationale for recovery of summer chum salmon populations that can be understood by County Commissioners, Tribal governments, local and regional decision-makers and the public.”

As stated in the HCCC plan,

The Summer Chum Salmon Recovery Plan provides analyses and action alternatives that are possible under the authorities of county policies and programs. County staffs have contributed to the development of the analyses provided and the action alternatives described. Each Board of County Commissioners will adopt the recommendations and action alternatives presented according to their respective policies and procedures. The Counties will also use the SRP as guidance in the development, modification and revisions of their respective regulatory programs related to the Growth Management Act and Shoreline Programs. Where applicable, public review processes will be undertaken by the Counties to allow the public to provide input and guidance for the Boards of County Commissioners as they deliberate the recommendations and develop regulatory policies and programs that support the recovery of summer chum salmon in Hood Canal and the Eastern Strait of Juan de Fuca (HCCC Plan, p. 6).

The Skokomish and Port Gamble S’Klallam Tribes are voting members of the HCCC. Several tribes have usual and accustomed fishing rights within the range of the ESU: Skokomish, Port Gamble S’Klallam, Suquamish, Jamestown S’Klallam, Lower Elwha Klallam, Lummi, Tulalip, and Swinomish. Fisheries harvest and hatchery management for the Hood Canal and the eastern Strait of Juan de Fuca watersheds are the direct responsibility of these Tribes and the Washington State Department of Fish and Wildlife (WDFW). The Point No Point Treaty Tribes (Skokomish, Port Gamble S’Klallam, Jamestown S’Klallam, and Lower Elwha Klallam) (PNPTT) and WDFW are the primary authors of a related planning process, the *Summer Chum Salmon Conservation Initiative* (SCSCI) (WDFW and PNPTT 2000).

The SCSCI process, initiated in 2000, is an ongoing planning forum and mechanism by which the co-managers are engaged in the development and implementation of harvest management regimes and supplementation programs. These regimes and programs are designed to provide opportunities for the recovery of summer chum salmon when integrated with aspects of habitat protection and restoration, also considered in the process. Annual reviews are documented in supplemental reports (e.g., WDFW and PNPTT 2003a and PNPTT and WDFW 2003), which can be found at <http://wdfw.wa.gov/fish/chum/chum.htm>. The HCCC Plan makes extensive use of the SCSCI and subsequent supplemental reports, as well as the limiting factors reports for Water Resource Inventory areas (WRIAs) 14, 15, 16, 17, and 18 (Correa 2002, Correa 2003, Kuttel 2003).

The fishery co-managers, WDFW and PNPTT (hereafter referred to as the co-managers), participated in the development of aspects of this Plan, and the Plan is designed to support and complement the co-managers’ fisheries and interim salmon recovery goals and objectives.

3.1 Description of ESU

The Hood Canal summer chum salmon ESU includes summer-run chum salmon populations that spawn naturally in tributaries to Hood Canal as well as in Olympic Peninsula rivers between Hood Canal and Dungeness Bay (FR 64 14508 March 25, 1999). The recovery planning area includes portions of the Washington counties of Jefferson, Mason, Kitsap, and Clallam; the reservations of the Skokomish, Port Gamble S'Klallam, and Jamestown S'Klallam Tribes; and portions of Water Resource Inventory Areas (WRIAs) 14, 15, 16, 17, and 18 (Correa 2002, Correa 2003, Kuttel 2003) (see Figure 2 of the Plan, below).

Summer chum salmon spawn in late summer, from late August through late October, and are “uniquely adapted to exploit spawning habitat when river and stream levels are typically low and before other populations and species of salmon return to spawn” (Ruckelshaus et al. 2006). Fry emerge from the gravel between early February and May (with peak emergence in March). Emerged fry travel almost immediately (within 12 hours) downstream to the estuaries and tidal marshes, where they begin a relatively rapid seaward emigration through nearshore marine environments in Hood Canal and bay estuaries, including eelgrass beds present in those areas. It appears that survival during this short period of early estuarine and nearshore residence is one critical factor determining the size of the subsequent adult run. After leaving their natal estuaries, summer chum juveniles likely outmigrate in schools along the shorelines of Hood Canal, Admiralty Inlet, and the eastern Strait of Juan de Fuca, and then north and westward through the Strait of Juan de Fuca to reach northeastern Pacific Ocean rearing areas (WDFW and PNPTT 2000; the Plan, pp. 69-71).

The PSTRT identified two independent populations of Hood Canal summer chum (Ruckelshaus et al. 2006). The Strait of Juan de Fuca population spawns in rivers and streams entering the eastern Strait and Admiralty Inlet. The Hood Canal population includes all spawning aggregations within the Hood Canal catchment.



Figure 1. Hood Canal/Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Planning Area. (from Figure 2, p. 5 of the Hood Canal Summer Chum Recovery Plan, Map developed by Gretchen Peterson, PetersonGIS.)

3.2 Current ESU Status

A status review of all west coast salmon species initiated in 1994 by NMFS (Federal Register 1994) determined that summer chum salmon originating from Hood Canal and the eastern Strait of Juan de Fuca watersheds represented an evolutionarily significant unit (ESU) (Johnson et al. 1997). In March 1999, the summer chum salmon ESU was listed as threatened under the Endangered Species Act (ESA) (16 U.S.C. Sec. 1531 et seq). NMFS reviewed the ESU in 2005 and determined that it still warranted ESA protection (Good et al. 2005).

Sixteen historically present “stocks” made up the Hood Canal summer chum salmon, of which eight are extant. Programs are underway to reintroduce summer chum to three of the eight watersheds where stocks were lost. The co-managers have identified all of these stocks in their SCSCI and subsequent supplemental reports (WDFW and PNPTT 2000, 2003). The PSTRT considers these stocks “subpopulations, which contribute to either the Hood Canal or Strait of Juan de Fuca population, depending on their geographical location” (Currens 2004, p. 19).

For planning purposes, the Plan assigned these stocks to six geographic groupings called “conservation units” (Figure 2 and Table 1). The Plan organizes descriptions of population status, limiting factors and threats, and recommended site-specific actions based on these conservation units.

3.3 Threats and Limiting Factors

The reasons for a species’ decline are generally analyzed in terms of limiting factors and threats. Limiting factors are defined as the biological conditions limiting population status (e.g. elevated water temperature). Threats are defined as those human activities or naturally induced actions that cause the limiting factors (e.g. loss of shade from riparian vegetation removal). The Plan relies on the SCSCI and its supplemental reports (WDFW and PNPTT 2000 and PNPTT and WDFW 2003), the Limiting Factors Reports for WRIAs 14, 15, 16, 17, and 18 (Correa 2002, Correa 2003, Kuttel 2003), and refugia studies (May and Peterson 2003) for analysis of threats and limiting factors affecting Hood Canal summer chum. From these sources, the Plan states that the primary factors for decline of the summer chum salmon are (1) climate-related changes in stream flow patterns, (2) fishery exploitation, and (3) cumulative habitat loss (p. 71), and that the interactions of human-induced changes to stream ecosystems and high harvest rates combined to render summer chum subpopulations more vulnerable to climate shifts. The Plan also notes that reduced abundance and loss of habitat probably also contributed to loss of life history diversity (p. 68).

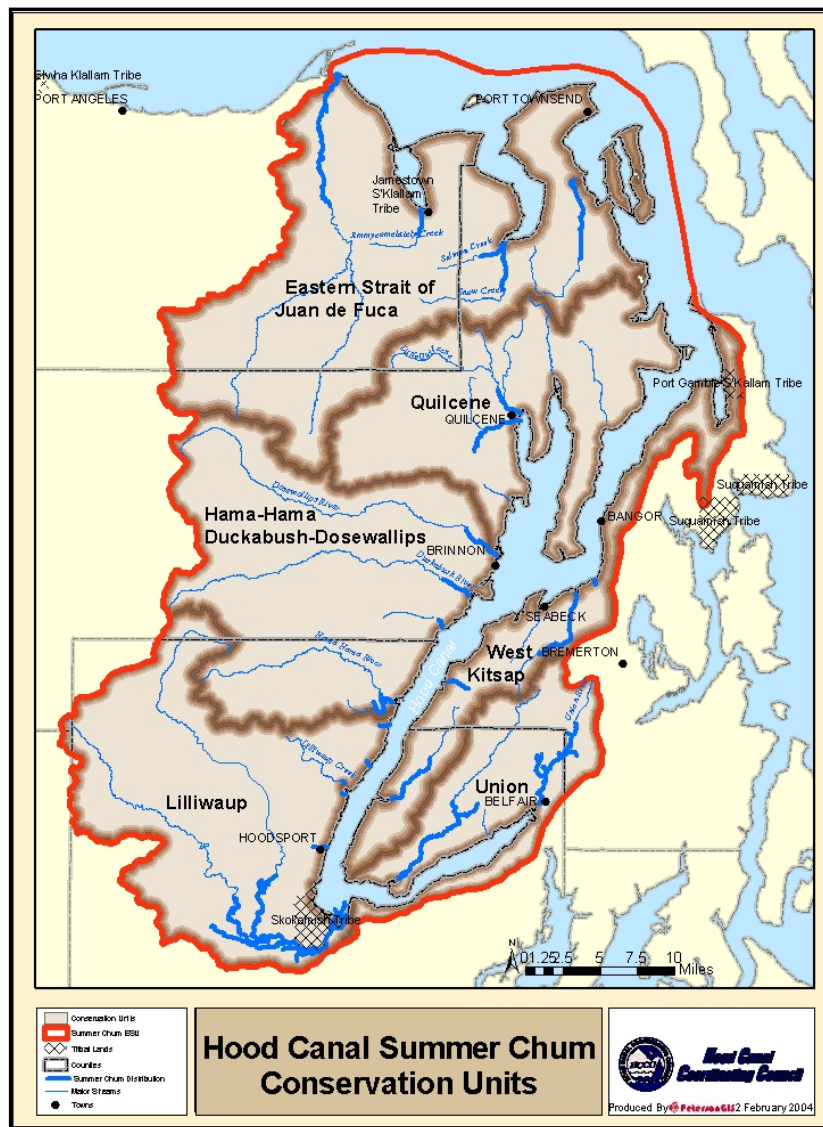


Figure 2. Hood Canal Summer Chum Conservation Units
(Figure 3.2, p. 36 of Hood Canal Plan)

Table 1. Summer chum salmon stocks associated with the designated conservation units

Conservation Unit	Stock	Status
Lilliwaup-Skokomish	Lilliwaup	Extant - Supplemented
	Finch	Extirpated ¹
	Skokomish	Extirpated
Hamma Hamma-Duckabush-Dosewallips	Hamma Hamma	Extant - Supplemented
	Duckabush	Extant
	Dosewallips	Extant
Eastern Strait of Juan de Fuca	Dungeness	Extant? Extirpated?
	Jimmycomelately	Extant - Supplemented
	Snow/Salmon	Extant – Supplemented in Salmon Creek only
	Chimacum	Extirpated - Reintroduced
Quilcene	Big/Little Quilcene	Extant - Supplemented
West Kitsap	Dewatto	Extirpated
	Anderson	Extirpated
	Big Beef	Extirpated - Reintroduced
Union	Union	Extant - Supplemented
	Tahuya	Extirpated - Reintroduced

3.3.1 Harvest

The Plan draws upon data and conclusions from the SCSCI indicating that harvest (in both the U.S. and Canada) was a factor in the decline of summer chum salmon prior to 1992, when the co-managers began changing harvest management to limit mortality from fishing “to a rate that allows the vast majority of summer chum salmon to return to their natal spawning grounds” (the Plan, p. 46). Before that, higher exploitation rates, ranging from 21 percent for the Salmon/Snow and Jimmycomelately stocks to 90 percent for the Quilcene stock, were seen to correlate with declines in escapements. The Plan also notes that these summer chum stocks are at the southern limit of the spawning range for this earliest returning race of chum salmon in the Northeast Pacific region, and they may therefore have a naturally lower level of productivity than those that spawn farther north, which in turn would make them less able to rebound from overharvest (the Plan, p. 47-48). Under the SCSCI, as adopted under the Plan, total exploitation rates are expected

¹ Extirpated – extinct in a particular area but surviving in others.

to average 10.8 percent and 8.8 percent for the Hood Canal and Strait of Juan de Fuca populations, respectively. Recent exploitation rates have been generally below 3 percent and 1 percent for Hood Canal and Strait of Juan de Fuca populations, respectively.

3.3.2 Hatcheries

There were no hatchery programs producing Hood Canal summer chum before supplementation started in 1992, and artificial production of other salmonid species is not considered to be a cause of Hood Canal summer chum decline. The Plan notes, however, the potential for negative interactions with other species of hatchery fish, including competition for food between summer chum and hatchery pink salmon (p. 20 of the Plan and also Table 6.2, p. 80 of the Plan), and competition in the estuary posed by fall chum salmon released during the summer chum emigration period (WDFW & PNPTT 2000, p. 79). Hatchery programs producing pink and fall chum salmon now delay release of these species until after the majority of summer chum have emigrated seaward as a measure to reduce risks of competition for food posed by the hatchery fish (WDFW and PNPTT 2000).

3.3.3 Habitat

The Plan notes that ample, high-quality habitat is essential to the recovery of summer chum salmon populations in the Hood Canal and Eastern Strait of Juan de Fuca. Adults migrate and spawn, and eggs incubate in freshwater; juveniles rear, find refuge, and migrate seaward in estuarine deltas and nearshore areas; and feeding and growth of juveniles and adults takes place in the open ocean. Chapter 6 of the Plan summarizes overall habitat issues for the ESU. More detail is included in the Plan's individual chapters on conservation units.

3.3.3.1 Stream Habitat

Table 6.1 of the Plan (p. 76, as modified from WDFW and PNPTT 2000) summarizes changes in freshwater habitat that contribute to summer chum decline: loss of channel complexity, altered sediment dynamics, and riparian degradation.

3.3.3.2 Estuary

Table 6.1 of the Plan also details estuarine loss from diking, filling, log storage, and road causeways.

3.3.3.3 Nearshore

Table 6.2 of the Plan (p. 77, taken from Lestelle, et al. 2005) details the interactions between modifications to streams and estuaries and nearshore conditions for juvenile chum. For example, that analysis assumed that prey availability within subestuaries² is related to riparian conditions in the lower portion of the adjoining freshwater system, and that removal of riparian vegetation

² Smaller systems within a larger estuary, such as a branching subtidal marsh creek with intertidal tributaries. – www.fishbase.org

along the shoreline also reduces inputs of prey to the nearshore environment. Shoreline development reduces the ecological functions upon which the fry depend.

3.3.3.4 Hood Canal Marine Waters

Hood Canal marine waters have had chronic low dissolved oxygen and several “extreme events” of low or no oxygen in recent years, with resulting mortality of marine organisms. There has been no documentation of the effects of these conditions on salmon; the Hood Canal Dissolved Oxygen Program Integrated Assessment and Modeling Program has been established to investigate the dissolved oxygen situation in Hood Canal. More information is available at <http://www.hoodcanal.washington.edu/index.jsp>

3.4 Goals

The “overall goal” set in the Plan is “to recover and obtain delisting of the summer-timed chum salmon populations in Hood Canal and the eastern Strait of Juan de Fuca watershed, including restoration of populations³ in watersheds where summer chum have been extirpated” (p. 12). The purpose of reintroducing summer chum to some historically occupied areas is to recover the populations’ spatial structure and diversity sufficiently to allow delisting. At the same time, the Plan also adopts the overall goal presented in the *Summer Chum Salmon Conservation Initiative*, as follows:

To protect, restore and enhance the productivity, production and diversity of Hood Canal summer chum salmon and their ecosystems to provide surplus production sufficient to allow future directed and incidental harvests of summer chum salmon (WDFW and PNPTT 2000) (quoted in the Plan, p. 12).

The HCCC Board, in considering a recovery plan that can be implemented and meets the desires of the land-use (Counties) and Tribal authorities, further adds that a summer chum salmon recovery plan be designed to provide:

- the Counties with as much certainty as is possible regarding development, growth and land use,
- as much certainty as is possible for Tribal goals and objectives, and
- as much certainty as is possible for private landowners.

Certainty means that the Plan will strive to give the Counties, Tribes, and public a clear understanding of salmon recovery, the actions required to achieve recovery, and the cost (p. 12-13 of the Plan).

3.4.1 The Plan’s Interim ESU-level Recovery Goals

The Plan adopts “interim” recovery goals for Hood Canal summer chum developed by the co-managers in the SCSCI (PNPTT and WDFW 2003). The Plan states that these goals “are

³ In this context, the Plan is actually referring to the stocks or subpopulations identified by the co-managers.

designed to provide numeric targets of summer chum salmon abundance and escapement for the purposes of recovery planning” (p. 14), and, further, that “When realized, the recovery goals are expected to provide, on average, sufficient surplus abundance to allow for directed and incidental harvests of summer chum salmon” (ibid.).

The co-managers set interim recovery goals in terms of abundance and escapement “thresholds” of natural-origin recruits for each of the stocks that make up the two extant populations. They linked these goals to specific criteria including duration and productivity that they believe should be met for recovery to be achieved. The ESU-wide interim recovery criterion set by the co-managers is for all eight of the extant stocks to meet all the individual stock recovery criteria (see Section 3.4.2, below). They further state, “The corollary to this criterion is that, on average, the ESU-wide abundance must meet or exceed the sum of all these individual stock thresholds and the ESU-wide spawning escapement must meet or exceed the sum of all these individual stock escapement thresholds; also, on average, the ESU-wide productivity must meet or exceed 1.6 recruits per spawner” (PNPTT and WDFW 2003). The Plan adopts this criterion for the ESU (p. 18).

To address the restoration and maintenance of population diversity for the ESU, the co-managers propose habitat protection and recovery, and the reintroduction of selected extirpated summer chum salmon stocks, where feasible (the Plan, p. 19).

These interim goals represent a stage of analysis in an ongoing collaboration between the co-managers, NMFS Northwest region staff, and the PSTRT. NMFS staff participated in the development of the co-managers’ interim recovery goals, and the PSTRT reviewed them. The PSTRT’s more detailed viability analysis for summer-run chum was not available at the time the Plan was being written. The Plan further explains that “The co-managers recognize that the recovery goals they developed are based on currently available, and limited, information, with the expectation that they may be revised as additional information is generated. The co-managers, however, ‘believe that these interim recovery goals provide effective initial targets to use in managing for recovery and that by meeting the goals, the risk of extinction will be reduced and the stocks will become more resilient while moving toward healthy abundance levels’” (PNPTT and WDFW 2003) (quoted in the Plan, p. 16). As the PSTRT’s detailed viability analysis is developed, discussion and collaboration with the co-managers and the other entities involved in the development of the Plan will continue. The PSTRT’s viability analysis will be incorporated into the Plan’s adaptive management process.

3.4.2 *The Plan’s Interim Stock-Level Recovery Goals*

The abundance “thresholds” for each stock that were provided as interim recovery goals under the SCSCI and included in the Plan were calculated as the arithmetic mean annual natural-origin recruit run sizes returning to the Hood Canal and Strait of Juan de Fuca marine areas adjacent to the summer chum streams. These recovery abundance goals reflect the abundance of summer chum before the recent population declines, based on the premise that the stocks were relatively healthy at that time. The pre-decline years used to derive mean recovery abundance are different for different stocks, depending on their identified abundance trends. For Hood Canal stocks, the averages are derived from abundances in the 1970s. For Strait of Juan de Fuca, averages are derived from abundances from the mid-1970s through the 1980s.

The Plan also provides interim escapement thresholds, defined as the number of natural-origin adults that return each year to the natal freshwater spawning grounds. Spawning escapement thresholds were estimated for each stock by dividing the identified stock abundance threshold by a recruit/spawner ratio of 1.6. Lacking adequate historical data, this ratio was selected because it was within a reasonable range of observed productivity levels, including documented estimates for summer chum populations in Alaska and British Columbia (PNPTT and WDFW 2003).

The Plan summarizes the co-managers' conclusions about historical impacts of harvest as a major cause of the summer chum's decline. Harvest increased substantially in the mid-1970s and 1980s, and the decline in summer chum abundance was observed beginning in 1979 (the Plan, pp. 47-48). Since the early 1990s, exploitation rates have declined by 90 percent or more.

The stock-specific abundance levels set as recovery goals reflect marine area abundance levels that would allow both adequate spawning escapement and harvest. These stock-specific abundance levels including both stock escapement and fish removed by fisheries better reflect pre-decline stock performance. The use of these abundance levels as interim recovery goals for individual stock abundance is supportive of and consistent with the SCSCI and Plan objective to recover summer chum to levels that will allow "future directed and incidental harvests." A more detailed description of the background can be found in SCSCI Supplemental Report No. 5, Interim Summer Chum Salmon Recovery Goals (PNPTT and WDFW 2003).

The individual stock recovery abundance and spawning escapement thresholds set by the co-managers and adopted as interim recovery goals in the Plan are as follows:

Eastern Strait of Juan de Fuca Population Annual Natural-Origin Summer Chum Abundance and Escapement Goals

Stock	Abundance	Escapement
Salmon/Snow	1,560	970
Jimmycomelately	520	330

Hood Canal Population Annual Natural-Origin Summer Chum Abundance and Escapement Goals

Stock	Abundance	Escapement
Quilcene (Big and Little)	4,570	2,860
Hamma Hamma	6,060	3,790
Duckabush	3,290	2,060
Dosewallips	3,080	1,930
Lilliwaup	3,130	1,960
Union	550	340

The co-managers' recovery criteria for each individual stock are as follows (the Plan, p. 18):

- The mean natural-origin abundance and mean natural-origin spawning escapement of each stock shall meet or exceed the above-described abundance and spawning escapement thresholds, over a period of the most recent 12 years.

- The natural-origin abundance and natural-origin spawning escapement of each stock shall be lower than the stock's respective critical thresholds (or, where applicable, minimum escapement flag)⁴ in no more than 2 of the most recent 8 years and, additionally, in no more than 1 of the most recent 4 years.
- Natural recruits per spawner shall average at least 1.6 over the 8 most recent brood years for which estimates exist and no more than 2 of the 8 years shall fall below 1.2 recruits per spawner.

3.5 Strategies and Actions for Recovery

Recognizing that there is uncertainty involved in taking actions to bring about salmon recovery, the Plan emphasizes incorporation of monitoring and adaptive management into the planning process, as well as long-term coordination of efforts (Chapter 3, p. 22). The Plan reviews principles for species recovery, starting with the “precautionary principle”: “act to avoid serious or irreversible harm, despite a lack of scientific certainty as to the likelihood, magnitude, or causation of that harm” (the Plan, p. 23, citing Cooney 2003). This approach is consistent with the principles of conservation biology, and follows technical guidance for recovery planning provided by the PSTRT (Ruckelshaus et al. 2003).

The Plan gives first priority to protecting the functioning habitat and major production areas of the ESU's eight extant stocks. Restoration of degraded areas will be considered a second priority, where recovery of natural processes appears to be feasible. Third, rehabilitation is considered an appropriate strategy when ecosystem processes or functions can be partially re-established. Fourth, substitution to re-create lost habitat features using technological intervention may be appropriate. A final strategy stated by the Plan is to accept the status quo in cases where political feasibility, or economic or technical limitations, indicate that habitat degradation will continue, and/or the subject habitat is beyond recovery (the Plan, p. 29, from NRC 1996, Figure 8-1). Table 3.6 in the Plan (inserted below as Table 2) summarizes the general strategic approach.

Table 2. General strategic approach for the recovery of summer chum salmon population production areas within each conservation unit. (In this table, “unconstrained” is defined as having functioning habitat conditions. “Constrained” is defined as having impaired or degraded habitat conditions.)

Priority	Category	Production Area Actions
1	Unconstrained with current summer chum salmon production	Recovery actions and strategies will focus upon protection and passive restoration of watershed processes.
2	Constrained with current summer chum salmon production	Recovery actions and strategies will focus upon restoration, rehabilitation, and substitution approaches, likely artificial, to achieve the watershed processes.
3	Constrained, but with no current summer chum salmon production, but likely had historic production	Pending the reasons for the current lack of summer chum salmon production and change from historic, recovery actions could be limited. Recovery actions and strategies will focus upon restoration, rehabilitation, and substitution

⁴ See Appendix 1.5 in WDFW and PNPTT 2003b for a description of the critical thresholds, minimum escapement flags, and their derivation.

Priority	Category	Production Area Actions
		approaches. Such actions may require artificial supplementation programs coupled with restorative habitat measures. Recovery actions and strategies for these areas will be determined on a case-by-case basis.
4	Unconstrained, neither current nor historic summer chum salmon production. Determined to contribute to structure and function crucial to persistence and survival of the population of concern.	Recovery actions and strategies will focus upon protection and passive restoration of watershed processes.
5	Constrained, neither current nor historic summer chum salmon production. With appropriate restoration and protection measures can contribute to function and structure to enhance persistence and survival of the population of concern.	Recovery actions and strategies will focus upon restoration, rehabilitation, and substitution approaches. Such actions may require artificial supplementation programs coupled with restorative habitat measures. Recovery actions and strategies for these areas will be determined on a case-by-case basis.
6	Constrained, neither current nor historic summer chum salmon production. Determined that area does not and cannot contribute to structure and function critical for the persistence and survival of the population of concern.	Status quo is likely maintained.

Given the above stepwise approach, the Plan sets priorities for recovery actions as follows (p. 31 of the Plan):

- 1) The first priority level of recovery would focus on the eight extant stocks' watersheds and associated marine areas (nearshore areas within one mile radius of the watershed's estuary).
- 2) The second priority level of recovery adds the eight extirpated stocks' watersheds and associated marine areas (nearshore areas within one mile radius of the watershed's estuary).
- 3) The third priority level of recovery provides for a focus on other watersheds in the ESU with recently documented observed summer chum salmon presence and associated marine areas (nearshore areas within one mile radius of these watersheds' estuaries).
- 4) The fourth priority level of recovery adds all remaining marine nearshore areas not previously addressed in priority levels 1, 2, and 3.

These priorities are applied to specific watersheds and stocks in the conservation unit sections (Sections 7-12) of the Plan.

The designation of six conservation units, encompassing the eight extant summer chum stocks, was intended to help organize recovery planning (Figure 3.2 below). "These designations allow community and volunteer groups and citizens that are already organized in the ESU to direct their efforts at specific recovery issues. Local land use authorities can then clearly see how their individual salmon recovery efforts fit in the comprehensive salmon recovery effort throughout

the ESU. . . The conservation unit construct provides an approach for salmon recovery that is responsive to the biological needs of the fish in the context of political, economic and social realities” (p.38 of the Plan).

The Plan

- Will focus on specific solutions or packages of solutions to specific problems in each . . . conservation unit and
- Will not focus on broad-gauge, generic ‘solutions’ that have the potential to overreach in terms of proposing new regulations or requiring radical changes that have little chance of being effectively implemented. (p. 40)

A full range of policy options for acquiring, funneling, and allocating resources for salmon habitat conservation was developed and presented to the members of the HCCC Board for review and decision-making. The Plan lists potential sources of funding, administrative paths, and target activities that could be undertaken for salmon recovery in the region (pp. 43-45), then makes site-specific recommendations in each conservation unit chapter (Chapters 7-12).

3.5.1 Watershed/Site-Specific Strategies and Management Actions

The Plan differentiates “programmatic” vs. “project” actions related to habitat. Programmatic actions are general guidelines such as found in county land use and regulatory programs or watershed planning processes, while project actions address specific, discrete activities such as levee removal and culvert repair. Proposed programmatic and project actions are detailed in each conservation unit chapter. The HCCC provided a summary table for this Supplement, linking limiting factors and recommended actions by conservation unit and stock (Table 3 below).

Table 3. Recommended Actions for Addressing Limiting Factors by Conservation Unit and Component Stock.

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
Eastern Strait of Juan de Fuca This unit includes the Dungeness River, Jimmycomelately Creek, Salmon Creek, Snow Creek, and Chimacum Creek watersheds. Also included are the marine nearshore waters stretching from Chimacum Creek estuary, extending along the western shore of Admiralty Inlet, and including Discovery Bay, Sequim Bay, and the Dungeness River estuary. Marine offshore waters of Admiralty Inlet and the Eastern Strait of Juan de Fuca are also included. The eastern portion lies within Jefferson County and the western portion within Clallam County.	Jimmycomelately Stock produced in Jimmycomelately Creek, where they spawn up to RM 1.5, are targeted for recovery by co-managers and PSTRT. One of two extant stocks making up Strait of Juan de Fuca aggregation.	<u>Programmatic Actions</u> <ul style="list-style-type: none"> • Clallam County enforce and monitor existing zoning for the Jimmycomelately watershed. • Implement National Forest road maintenance and road abandonment plans. • Complete the Jimmycomelately Creek-Lower Sequim Bay Estuary Restoration Project. • Continue the Jimmycomelately Creek Summer Chum Salmon Supplementation Project. 	Loss of channel complexity; sediment aggradation; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.
	Salmon/Snow Stock produced in Salmon and Snow Creek watersheds, where they spawn up to RM 2.0 in Salmon Creek, and RM 3.0 in Snow Creek, are targeted for recovery by co-managers and PSTRT. One of two extant stocks making up Strait of Juan de Fuca aggregation.	<u>Programmatic Actions</u> <ul style="list-style-type: none"> • Support the Snow/Salmon Watershed Fish and Wildlife Management Plan process. • Jefferson County enforce and monitor present zoning for the upper watersheds. • Implement a Community Nearshore Restoration program for Discovery Bay. • Monitor results of the now terminated Salmon Creek Summer Chum Salmon Supplementation Project. • Pursue agricultural Best Management Practices programs. <u>Projects</u> <ol style="list-style-type: none"> 1. Remove railroad grade, fill, and levees along estuary to restore salt marsh and tide flat. 2. Decommission National Forest roads. 	Loss of channel complexity; increase in peak flows; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries; increased sedimentation

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
	<p>Chimacum (3)</p> <p>The indigenous Chimacum Creek summer chum stock was extirpated, but a naturally spawning aggregation, using transplanted Salmon/Snow stock as donor, has been reintroduced. Chimacum Creek is considered, at least initially, an extension of the Salmon/Snow summer chum stock.</p>	<p><u>Projects</u></p> <ul style="list-style-type: none"> • Fee-simple purchase or conservation easement of: 1) remaining estuary parcels, 2) mainstem floodplain, and 3) parcels downstream of federal lands. • Monitor results of the now terminated Chimacum Creek Summer Chum Salmon Reintroduction Project. 	<p>Increased fine sediments; increased peak flow, freshwater wetland loss, and channel instability; low flows; nearshore habitat degradation including loss of estuaries and subestuaries.</p>
<p>Quilcene</p> <p>This unit includes the Big Quilcene River and Little Quilcene River watersheds as well as the Tarboo Creek and Thorndyke Creek watersheds. Also included are the marine nearshore waters and estuaries of the Dosewallips River, Quilcene Bay, Dabob Bay, and the Toandos Peninsula to the west side of Hood Canal and north through Port Ludlow.</p>	<p>Big/Little Quilcene</p> <p>Stock naturally produced in Big and Little Quilcene watersheds, where they spawn up to RM 2.8 and RM 3 respectively, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal aggregation.</p>	<p><u>Programmatic Actions</u></p> <ul style="list-style-type: none"> • Support the recommendations of the WRIA 17 watershed planning process regarding the City of Port Townsend water supply. Support City of Port Townsend's efforts to ensure adequate spawning flow in the lower Big Quilcene. • Support and monitor Jefferson County's present zoning for the upper watersheds. • Monitor results of the now terminated Quilcene National Fish Hatchery Summer Chum Supplementation Proj. <p><u>Projects</u></p> <ul style="list-style-type: none"> • Remove dikes along the Big Quilcene River and Little Quilcene River and nearshore to restore salt marsh habitat. • Remove landfill and bulkhead between Boat Haven Marina and Indian George Creek on Quilcene-Dabob Bay to restore historic salt marsh and intertidal habitat. 	<p>Low flows; loss of channel complexity; sediment aggradation; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.</p>

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
Hamma Hamma-Duckabush-Dosewallips This unit includes the Hamma Hamma, Duckabush, and Dosewallips River watersheds, their estuaries, the marine nearshore areas around these areas and the mid Hood Canal marine waters.	Hamma Hamma Stock naturally produced in Hamma Hamma watershed, where they spawn up to RM 2 in Hamma Hamma R. and up to RM 1.8 in John Ck, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal aggregation.	<u>Programmatic Actions</u> <ul style="list-style-type: none"> Continue and monitor the Hamma Hamma River Summer Chum Salmon Supplementation Project. Develop a comprehensive floodplain management and restoration plan for the Lower Hamma Hamma watershed. <u>Projects</u> <ul style="list-style-type: none"> Remove fill and relocate structures along north side of Wacetickeh estuary and north of shellfish facility to restore marsh. 	Loss of channel complexity; altered sediment dynamics; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.
	Duckabush Stock naturally produced in Duckabush watershed, where they spawn up to RM 3.5 in Duckabush R., are targeted for recovery by co-managers and PSTRT. One of 6 extant stocks making up Hood Canal aggregation.	<u>Programmatic Actions</u> <ul style="list-style-type: none"> Support and monitor Jefferson County zoning for Duckabush watershed. <u>Projects</u> <ul style="list-style-type: none"> Remove dike along Robinson Road. Remove levees and rip-rap in lower river to restore channel sinuosity. 	
	Dosewallips Stock naturally produced in Dosewallips watershed, where they spawn up to RM 4.3, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal aggregation.	<u>Programmatic Actions</u> <ul style="list-style-type: none"> Support and monitor Jefferson County zoning for Dosewallips watershed. Develop Dosewallips River comprehensive floodplain management plan. <u>Projects</u> <ul style="list-style-type: none"> Remove dikes in vicinity of mainstem Dosewallips River and estuary to restore estuarine habitat and channel complexity. 	

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
		<ul style="list-style-type: none"> Restore Sylopash slough tidal prism and riparian area. 	
Lilliwaup-Skokomish This unit includes the Lilliwaup River and Skokomish River watersheds, as well as the estuaries and nearshore up to the Hamma Hamma watershed.	Lilliwaup Stock naturally produced in Lilliwaup Creek, where they spawn up to RM 0.7, are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal aggregation. The indigenous summer chum stock in the Skokomish was extirpated, but summer chum spawning, presumably from few strays, is observed.	<u>Programmatic Actions</u> <ul style="list-style-type: none"> Support and monitor Mason County zoning and develop comprehensive plan. Support stormwater management planning for Hoodport and Skokomish areas. Continue and monitor the Lilliwaup Creek Summer Chum Salmon Supplementation Project. <u>Projects</u> <ul style="list-style-type: none"> Remove bulkhead, fill, and diking to restore nearshore processes, juvenile migration corridor, and salt marsh habitat. 	Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.
Union This unit includes the Union River and Tahuya River watersheds and the marine nearshore waters east of the town of Union near the mouth of the Skokomish River north to Rendsland Creek.	Union Stock naturally produced in Union watershed, where they spawn up to RM 2.5 in Union R., are targeted for recovery by co-managers and PSTRT. One of six extant stocks making up Hood Canal aggregation.	<u>Programmatic Actions</u> <ul style="list-style-type: none"> Support Mason County zoning and comprehensive plan/CAO updates and monitor the results. Monitor results of the now terminated Union River Summer Chum Salmon Supplementation project, and continue and monitor the on-going program to collect broodstock for reintroduction of summer chum in the Tahuya River. <u>Projects</u> <ul style="list-style-type: none"> Remove dike, tide gates, fill, bulkhead, and levees to restore habitat. 	Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries.

Conservation Unit	Target Stocks (1)	Recommended Key Actions (2)	Habitat Factors for Decline
	<p>Tahuya (3)</p> <p>The indigenous Tahuya summer chum stock was extirpated, but a self-sustaining naturally spawning aggregation, using transplanted Union stock as donor, is being reintroduced. Spawning in the Tahuya R can occur up to RM 8.0.</p>	<p><u>Programmatic Actions</u></p> <ul style="list-style-type: none"> Support Mason County zoning and comprehensive plan/CAO updates and monitor results. Continue and monitor the Tahuya River Reintroduction/Union River Supplementation project. <p><u>Projects</u></p> <ul style="list-style-type: none"> Remove helicopter landing pad downstream from Northshore Road. 	<p>Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries; water quality, temperature</p>
<p>West Kitsap</p> <p>This unit includes Big Beef Creek, Big Anderson Creek, and the Dewatto River watersheds, their estuaries and associated marine nearshore areas.</p>	<p>Big Beef (3)</p> <p>The indigenous Big Beef summer chum stock was extirpated, but a self-sustaining naturally spawning aggregation using transplanted Quilcene stock is being reintroduced. More study needed to determine whether stock will be targeted for recovery. The indigenous summer chum stocks in Dewatto and Big Anderson are extirpated. Spawning in the Dewatto, presumably from few strays, is observed.</p>	<p><u>Programmatic Actions</u></p> <ul style="list-style-type: none"> Update Kitsap County's Shoreline Master Plan and CAOs and monitor results. Conduct a Nearshore Assessment. Adopt the Kitsap County Draft Shoreline Environmental Designations. Continue and monitor the Big Beef Creek Summer Chum Salmon Reintroduction project. <p><u>Projects</u></p> <ul style="list-style-type: none"> Restore natural tidal processes, sediment transport in subestuary by addressing causeway and hatchery weir. Remove fill. 	<p>Loss of channel complexity; riparian degradation; nearshore habitat degradation including loss of estuaries and subestuaries; summer low and peak flows</p>

- (1) Existing summer chum stocks with identified interim recovery goals by the co-managers.
- (2) Salmon Recovery Plan includes extensive list of recommended actions (projects and programs). This table summarizes selected, key recommendations.
- (3) No interim recovery goals identified for these stocks, which are considered extirpated; however, a self-sustaining stock is being reintroduced using an adjacent transplanted stock as donor broodstock.

3.5.2 Regional Strategies

In Chapter 13, the Plan details programmatic actions for each county within the ESU, focusing on habitat improvement, including enforcing and monitoring existing zoning and comprehensive plan elements, urban stormwater planning and management, and estuary and nearshore restoration. The Plan acknowledges existing regional programs for habitat improvement, such as the HCCC's Community Nearshore Restoration Program and the state's Shoreline Management Act (SMA), and recommends that the counties incorporate programmatic actions for salmon recovery into their updating of Shoreline Management Plans (SMPs) required under the SMA. In the following sections of the Supplement, the Plan's regional strategies with regard to habitat, harvest, hatcheries, and integrated management across these factors ("all-H integration") are summarized.

3.5.2.1 Habitat Protection and Restoration

As the Lead Entity for the Hood Canal watershed under RCW 77.85, HCCC staff worked with the various local groups interested in salmon recovery to develop a strategy to guide the selection of habitat restoration projects. This strategy is available for review at www.hccc.wa.gov. It sets high priority on protection and restoration of the lower two miles of freshwater summer chum production areas, estuaries, tidal marshes, and nearshore eelgrass meadows, and areas or processes that contribute to these zones. This strategy has been in place for six years; the current text notes that when the ESA recovery plan has been approved, the Plan will become the guiding document.

3.5.2.2 Harvest Management

The co-managers developed through the SCSCI a harvest management strategy that uses a conservative four-way control mechanism, called the Base Conservation Regime (BCR) (Details in WDFW and PNPTT 2000, section 3.5.6.1):

- A base set of fishery-specific management actions for fisheries in pre-terminal (Canadian, U.S.), Washington terminal, and Washington extreme terminal areas;
- Management unit and stock abundance and escapement thresholds that trigger review and possible adjustment of the management actions;
- Expected fishery-specific exploitation rate targets and ranges based on the application of the BCR on the summer chum management units; and
- Overall management performance standards that are based on natural production against which to assess success of the regime and make necessary adjustments. The actions required depend both on the status of the management unit and the stocks within them, with the most conservative controls prevailing.

The intent of the BCR is to initiate rebuilding, by fostering incremental increases in escapement over time, while providing a limited opportunity for fisheries conducted for the harvest of other salmon species. The BCR will pass-through to spawning escapement, on average, in excess of 95 percent of the Hood Canal-Strait of Juan de Fuca summer chum abundance in U.S. waters and close to 90 percent of the total abundance of the run (including Canadian interceptions).

Estimated exploitation rates for fisheries in Canadian and U.S. waters (both pre-terminal and terminal fisheries) that impacted summer chum salmon during the years 2001-04 (since the implementation of the SCSCI), were well below the target exploitation rates, as determined by the co-managers as part of the BCR. The Plan concludes that the harvest management regime established for Hood Canal/Eastern Strait of Juan de Fuca summer chum salmon is working according to expectations and contributes to recovery of the species (Plan, p. 51).

The harvest management component of the SCSCI was provided to NMFS in 2000 as the co-managers' proposed joint Resource Management Plan (RMP) for managing salmon fisheries to meet summer chum salmon ESA conservation needs. NMFS subsequently determined that the RMP adequately addressed all requirements specified under Limit 6 of the ESA 4(d) Rule for Hood Canal summer chum salmon. More information can be found at <http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/State-Tribal-Management/HC-Chum-RMP.cfm>. Nevertheless, NMFS and the co-managers will continue to evaluate the performance of the BCR as new information becomes available, consistent with the evaluation and adaptive management elements of the SCSCI and the Plan.

3.5.2.3 Hatchery Management

The Plan incorporates the supplementation and reintroduction approach implemented by the co-managers under the SCSCI beginning in 1992 to conserve summer chum salmon in the action area. Under the SCSCI, artificial production directed at summer chum recovery would be applied only to preserve stocks identified as at moderate or high risk of extinction, and to reintroduce naturally spawning aggregations in selected watersheds where the indigenous stocks had become extirpated. In addition, implementation of conservation hatchery actions was guided by these premises: "Commensurate, timely improvements in the condition of habitat critical for summer chum salmon survival are necessary to recover the listed populations to healthy levels . . . The intent of the supplementation efforts is to reduce the short-term extinction risk to existing wild populations, and to increase the likelihood of their recovery" (the Plan, p. 54).

The co-managers' supplementation and reintroduction programs have a sunset clause, which limits the duration of all hatchery programs to a maximum of three summer chum salmon generations (12 years). Comprehensive monitoring and evaluation is set up to ascertain the success or lack of success of each program, its effects on natural populations, and when to stop supplementation.

As of June 2005, three summer chum salmon supplementation programs and one reintroduction program have been terminated after meeting individual project goals specified in the SCSCI (WDFW and PNPTT 2000). Projects that have been terminated include the Big Quilcene River, Salmon Creek, and Union River summer chum supplementation programs, and the Chimacum

Creek summer chum reintroduction program. The last releases of fish from these programs occurred in 2004 (Brood Year 2003) (the Plan, p. 56). Supplementation programs continue for the Lilliwaup Creek, Hamma Hamma River, and Jimmycomelately Creek summer chum stocks, and a reintroduction program on Big Beef Creek also continues. A third reintroduction program is now underway on the Tahuya River (beginning in 2003) using Union stock as donor.

The Plan restates findings presented in the 2004 NMFS Salmon Hatchery Inventory and Evaluation Report (NMFS 2004f) regarding the effects on summer chum salmon ESU and stock viability of the Hood Canal summer chum conservation hatchery programs:

Supplementation and reintroduction programs implemented since 1992 have benefited total ESU abundance, and the abundance of natural-origin summer chum salmon returning to spawn in regional watersheds. The programs have helped preserve existing diversity in the ESU, and have led to range extensions of several populations by creating genetic reserves, reducing the risk of further genetic diversity reduction. Population spatial structure has also benefited through the reintroduction of naturally spawning, and now natural-origin spawning populations, in two watersheds where native populations were extirpated (Big Beef Creek and Chimacum Creek), with a third watershed in the initial stages of reintroduction (Tahuya River). It is unknown whether the hatchery programs have affected ESU productivity, but recent recruit per spawner data for naturally spawning populations enhanced through the programs suggests that productivity is not being adversely affected (WDFW and PNPTT data from 5 year report in progress, 2005) (Plan, Section 15, p. 299).

The summer chum salmon supplementation and reintroduction programs identified in the SCSCI were provided to NMFS by the co-managers in 2000 for ESA review in the form of eight individual Hatchery and Genetic Management Plans (HGMP). In March 2002, NMFS determined that the HGMPs adequately addressed all requirements specified under Limit 5 of the ESA 4(d) Rule for Hood Canal summer chum salmon (NMFS 2002a; 2002b; 2002c). More information can be found at <http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/Hatcheries/Approved-HGMPs.cfm>. Nevertheless, NMFS and the co-managers are continuing to evaluate the performance of these programs as new information becomes available, consistent with the evaluation and adaptive management elements of the SCSCI and the Plan.

3.5.2.4 Integration Across the Hs - Adaptive Management

In salmon recovery planning, it has become common usage to refer to the major categories of limiting factors (habitat, harvest, hatcheries, and hydropower) as the “Hs,” and to speak of integrating or coordinating recovery actions among these factors as “all-H integration.” In this Plan, all-H integration is itself integrated into the adaptive management, research, monitoring, and evaluation program. The Plan states that “As aspects of harvest management are analyzed and integrated with aspects of hatcheries/supplementation (see section 5) and habitat restoration and protection, adaptive management will allow the opportunity to address all aspects/programs that contribute to recovery (see section 14).”

Section 14 of the Plan contains a detailed discussion and summary of the types of monitoring that are proposed to support long-term adaptive management of Hood Canal summer chum salmon recovery. The types are described as follows:

- Implementation monitoring to determine whether habitat actions were implemented as designed; whether regulatory program requirements were met; and to assess recovery plan progress.
- Direct effectiveness monitoring to identify whether habitat actions and land use/management actions achieve desired habitat conditions.
- Cumulative effectiveness monitoring to gauge effects on VSP parameters and to identify habitat impacts and habitat trends.

As noted in Section 3.5.2.2 of this document, the harvest management plan is keyed to natural production and is “designed to limit mortality from fishing to a rate that allows the vast majority of summer chum salmon to return to their natal spawning grounds” (Plan, p. 46). Artificial production of summer chum is limited to supplementation and stock reintroduction for conservation purposes only, and carefully controlled to limit risks to natural populations, with extensive monitoring and evaluation implemented to verify effects. The same types of monitoring described above for habitat are included in the adaptive management programs in the SCSCI and the Plan for harvest and hatchery actions. And, as noted in Section 3.5.2.3 of this document, “commensurate, timely improvements” in habitat are recognized as necessary to accompany successful supplementation.

The Plan states that the co-managers and the HCCC will work together on annual reports and five-year reviews of plan elements and progress, and on making adjustments to plan elements based on information from the monitoring and evaluation program.

3.6 Plan Implementation

Section 15 of the Plan provides details regarding entities responsible for implementing the recommended actions, as well as a fundraising strategy. The Plan acknowledges that estimating a timeline for recovery is “fraught with huge amounts of uncertainty,” including availability of resources, continued political will, and the fact that many of the actions needed must take place on private property. The implementation plan, therefore, defines actions proposed for summer chum salmon recovery over the next 10 years, with commitments for annual and five-year reviews, monitoring and evaluation, and adaptive management.

3.7 Estimates of Time and Costs

The ESA section 4(f)(1) requires that the recovery plan include “estimates of the time required and the cost to carry out those measures needed to achieve the Plan’s goal and to achieve intermediate steps toward that goal” (16 U.S.C. 1531-1544, as amended).

Appendix D of the Plan contains cost estimates for 78 of the 107 habitat projects proposed in the Plan. The estimates were prepared by Evergreen Funding Consultants in late 2004. In addition, the cost of various non-capital needs was estimated using a spreadsheet model. The model

estimates costs such as staffing directly associated with implementation of the Plan, including design, permitting, and management of capital projects, interagency coordination, and some monitoring activities. In summary, the budget costs of the initial ten-year implementation of the Hood Canal salmon recovery strategy were estimated as follows:

Summer chum habitat projects (estimated in detail)	\$101 million	
Other summer chum projects (rough estimate)	\$ 30 million	
Non-capital costs (estimated in detail)	\$ 3.1 million	
Continuing agency/organization costs (rough estimate)	<u>\$ 2 million</u>	
TOTAL APPROXIMATE BUDGET COSTS		\$136.1 million

3.8 Public and Scientific Review

The ESA requires both public review and scientific peer review of draft recovery plans. The processes for public and scientific review are described in the following sections.

3.8.1 HCCC Public Process

During development of the Plan, various issues and sections of the Plan were presented at public meetings of the HCCC Board. The Plan is available on the HCCC website, and interested organizations and individuals received notice of its availability. The Plan was presented in public meetings of the Boards of Commissioners of the four counties: Mason, Jefferson, Kitsap, and Clallam. It was also presented to the HCCC Board, which includes the commissioners of Mason, Jefferson, and Kitsap counties, as well as elected tribal council members from the Skokomish and Port Gamble S'Klallam Tribes. The HCCC has an ongoing public outreach program involving presentations concerning Hood Canal summer chum salmon recovery to numerous organizations and groups in the area.

In fulfillment of the ESA's formal review requirements, NMFS will provide a 60-day public review and comment period before the Plan is finalized. Further information regarding the public review process can be found in Supplement Section 5.4 and at the NMFS website, <http://www.nwr.noaa.gov/Salmon-Recovery-Planning.cfm> as well as the HCCC website, <http://www.hccc.wa.gov/SalmonRecovery/default.aspx>

3.8.2 Scientific Review

As in other regional domains defined by NMFS Northwest Region, the Hood Canal planning effort was supported by a NMFS-appointed science panel, the PSTRT. This panel of seven scientific experts from Federal, state, local, and tribal organizations identified historical summer chum salmon populations and developed ESU viability criteria. They provided scientific review of the May and June 2005 drafts of the Plan. In addition, staff biologists of the Skokomish and Port Gamble S'Klallam Tribes reviewed the Plan at each stage, and County staff reviewed the land use planning sections. NMFS Northwest Region staff biologists also reviewed draft versions of the Plan and provided substantial guidance for revisions.

4.0 THE PLAN AND ESA REQUIREMENTS

As indicated in Section 1.0 of this Supplement, NMFS' approach to developing a recovery plan for the Hood Canal summer chum salmon ESU has been to support and participate in locally led watershed and ESU-scale planning efforts. For NMFS to formally approve the Plan developed by the local governments and Tribes represented by the HCCC, the Plan must meet certain statutory requirements specified in ESA sections 4(f)(1)(B) and 4(a)(1).

- ESA section 4(f)(1)(B) states: "Each plan must include, to the maximum extent practicable,
 - “(i) a description of such site-specific management actions as may be necessary to achieve the Plan’s goal for the conservation and survival of the species;
 - (ii) objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this section, that the species be removed from the list; and,
 - (iii) estimates of the time required and cost to carry out those measures needed to achieve the Plan’s goal and to achieve intermediate steps toward that goal.”
- ESA section 4(a)(1) lists the factors to be considered for listing, re-classification, or delisting of a species:
 - A. The present or threatened destruction, modification, or curtailment of its habitat or range
 - B. Over-utilization for commercial, recreational, scientific or educational purposes
 - C. Disease or predation
 - D. The inadequacy of existing regulatory mechanisms
 - E. Other natural or manmade factors affecting its continued existence

In addition, it is important for the Plans to provide the public and decision-makers with a clear understanding of the goals and scientifically supported strategies needed to recover a listed species (NMFS Interim Recovery Planning Guidance, October 2004).

Section 4.1 contains NMFS' assessment of and conclusions regarding the Plan's overall goals and recovery strategy. Section 4.2 is a summary of how the Plan meets the ESA section 4(f)(1)(B) requirements, including the ESA section 4(a)(1) factors for re-classification or delisting of the ESU. NMFS concludes that the Plan makes good progress toward meeting the ESA requirements, with the understanding that within the next year, collaborative work will continue between the PSTRT and the co-managers to further evaluate and refine the PSTRT recommendations for ESU viability criteria. The interim, stock-level recovery goals incorporated into the Plan are appropriate targets, increasing certainty that summer chum salmon populations are preserved and that substantive progress is made toward ESU recovery for the initial plan implementation period. NMFS expects that the ESU viability criteria derived through the PSTRT-co-manager collaborative process will build upon the co-managers' interim stock-level

recovery goals with new information and analyses and will then be adopted by the HCCC as the long-term recovery goals for Hood Canal summer chum.

4.1 The Plan's Recovery Goals and Recovery Strategy

The Plan's recovery strategy is intended to meet the co-managers' interim stock-level recovery goals, with the expectation that the strategy is consistent with long-term ESU recovery and will be modified in the future as the Plan is implemented, the PSTRT's viability analyses and criteria are applied and fully addressed, and adaptive management proceeds. NMFS supports this strategy.

4.1.1 Recovery Goals

The PSTRT has identified two independent populations of summer chum salmon within the Hood Canal summer chum salmon ESU. The stocks defined in the Plan "nest" within these two populations. It will be necessary to link the co-managers' interim goals for these component stocks with longer-term viability criteria at the population and ESU levels. The PSTRT's draft population and ESU level viability analyses (NMFS 2006) are drawn upon below to describe criteria to ensure persistence of the ESU over the longer term. The PSTRT will continue to work with HCCC staff and the co-managers to integrate these long-term criteria with the interim stock-level recovery goals described in the Plan. This will not necessitate a revision of the Plan but will be considered part of the adaptive management and implementation phase of the recovery plan.

4.1.2 Recovery Strategy

The Plan's overall recovery strategy is summarized in Section 3.5 of this Supplement. The Plan's recovery strategy appropriately emphasizes monitoring and adaptive management and incorporates principles of conservation biology, setting protection of functioning habitat and extant populations as the first priority. NMFS supports the overall strategy. However, NMFS expects that further work will be done to address these priorities as new information becomes available.

In this section we further emphasize, reinforce, or augment particular elements of the Plan's recovery strategy to ensure uncertainties are minimized to the extent possible at this time. Elements of the strategy are discussed under the three H-factors (habitat, harvest, and hatcheries), adaptive management, and all-H integration.

4.1.2.1 Habitat

The Plan has been revised to incorporate the May and July 2005 comments from NMFS and the PSTRT. NMFS identifies the following strengths of habitat elements of the Plan:

- The information that is provided in the Plan is clearly and logically presented.
- The "Strategic Approach" (Chapter 3) provides a good discussion of the conceptual basis for the development of the Plan.

- The factors for decline in freshwater and nearshore/estuary areas and the affected life stages are clearly described in a series of summary tables with accompanying graphs.

However, NMFS provides the following considerations with regard to the Plan's statement that climate-related changes in stream flow patterns are a factor for decline: In any case, it is true that summer chum are particularly sensitive to instream flows that vary naturally between years and perhaps over decades. Possible changes in climate over the past 30 years were reasoned from flow records and have not been investigated by a detailed study. The trend in late summer low flows described in WDFW and PNPTT (2000) was not sustained from 1994 through 2003 and may reflect stochastic variation as much as possible climate change. The two watersheds that have a snow-dominant hydrology, the Dosewallips and Dungeness rivers, would be expected to show a trend of lower summer flows over the next few decades if the regional snowpack gradually shrinks from climate change.

NMFS believes the habitat element of the Plan is adequate.

4.1.2.2 Harvest

Implementation of the harvest management strategy since 2000 has worked as expected. Escapements have increased to all components of the ESU, and observed exploitation rates are even lower than anticipated (below 3 percent and 1 percent for Hood Canal and Strait of Juan de Fuca populations, respectively). The Plan describes the various harvest forums and the structure of the harvest management planning process. Harvest management is a government-to-government process among tribal, state, and Federal managers. Fisheries affecting the summer-run chum salmon ESU are implemented under the principles of the Pacific Salmon Treaty, the Magnuson-Stevens Act, U.S. v. Washington, and the Hood Canal Salmon Management Plan. Fishery management will continue to fall under the purview of the laws governing each of the harvest management forums. Technical or policy forums created for the Plan and considering harvest issues must work with the parties in these existing harvest management forums to ensure that harvest planning activities are coordinated.

The harvest strategy in the Plan includes explicit assumptions regarding the level of Hood Canal summer chum harvest in Canadian fisheries. This is an important element in the overall harvest strategy, since past high exploitation rates in Canadian fisheries contributed to overharvest as a factor of decline for the ESU. NMFS and the co-managers will continue to address Canadian harvest of Hood Canal summer chum through the Pacific Salmon Treaty forum and future negotiations in order to maintain Canadian harvest levels within those stipulated in the Plan, or at levels that the best available information indicates are consistent with the recovery of the ESU.

NMFS believes the harvest element of the Plan is adequate.

4.1.2.3 Hatcheries

The PSTRT concluded in its 2005 review of the Plan that the hatchery strategy to supplement summer chum in Hood Canal is very well designed and has been well implemented throughout its tenure. The monitoring information resulting from the hatchery program is exemplary, and the

co-managers have used the data to adjust their supplementation strategies as needed. The PSTRT noted that the hatchery strategy was not explicitly linked in the Plan to desired recovery outcomes for summer chum in Hood Canal. The HCCC responded that linkages between the hatchery strategy and the recovery strategy are addressed in the H-integration strategy, and such linkages are also discussed in the SCSCI and subsequent progress reports developed as part of the supplementation program.

NMFS believes the hatchery element of the Plan is adequate.

4.1.2.4 Adaptive Management and Monitoring

The Plan has extensive provisions for monitoring, evaluation, and adaptive management. In addition, the HCCC is developing a more detailed monitoring and adaptive management plan to be in place by December 2006 as part of the overall implementation program. NMFS believes the adaptive management and monitoring element of the Plan is adequate.

NMFS has developed an adaptive management framework to help guide monitoring and evaluation programs for this and other recovery plans. The framework is based on a decision structure that identifies the questions that need to be answered to provide the information NMFS needs for ESU status reviews and delisting decisions. The decision structure builds upon (a) the ESU and population viability principles described in McElhany et al. (2000) and associated indicators proposed by the TRTs, and (b) the identified threats limiting population and ESU viability as defined by the five statutory listing factors in section 4(a)(1) of the ESA (see Supplement Section 4.2.1.2). In addition, the document clarifies the purpose of the various types of monitoring used in salmon recovery programs and offers advice on setting priorities for monitoring in the context of limited resources. NMFS' Salmon Recovery Division will provide a web-accessible link to this document and staff support to help HCCC and other regional, state, tribal, and local entities develop appropriate research, monitoring, and evaluation plans for adaptive management.

4.1.2.5 All-H Integration

Technical models are important implementation tools for effective harvest, hatchery, and habitat management. Monitoring plans within the Hood Canal summer-run chum recovery plan should include evaluation of available technical management models in order to increase the certainty that annual management regimes will meet their resource management and conservation objectives. Where currently unavailable, modeling tools should be developed to improve assessment of effects of management actions on salmon and salmon habitat. In particular, quantitative integration models should be developed that can be used together with empirical information to assess the cumulative effects of actions across the Hs on recovery of the ESU.

Implementation of the Plan is designed to ultimately achieve goals for the four VSP parameters of abundance, productivity, diversity, and spatial structure. The PSTRT has generally described diversity and spatial structure criteria. NMFS expects that management objectives for diversity and spatial structure will be further refined over the next several years as part of recovery plan implementation. As these objectives are refined, the recovery plan and resource management

plans will incorporate both the objectives and analyses of the effectiveness of the plans in meeting all four VSP objectives based on information gathered through the adaptive management programs.

4.1.2.6 Other Issues

Actions to recover both the Hood Canal summer-run chum and Puget Sound Chinook salmon ESUs are occurring in many of the same watersheds, hatchery programs, and fisheries. Managers will evaluate recovery actions and programs for the two ESUs to maximize efficiencies in staff and financial expenditures where overlaps in recovery strategies occur, to find opportunities in the recovery strategies for synergistic effects in recovering both ESUs, and to minimize adverse effects of implementing the recovery plan for one ESU on the other ESU where they are unavoidable.

4.2 ESA section 4(f)(1)(B) Requirements

This section contains a discussion and summary of how the Plan meets the three section 4(f)(1)(B) requirements and the five section 4(a)(1) threats criteria listed at the beginning of Section 4 of this Supplement.

4.2.1 Objective, Measurable Criteria

Evaluating a species for potential delisting requires an explicit analysis of population or demographic parameters (the biological recovery criteria) and also of threats under the five ESA listing factors in ESA section 4(a)(1). Together these make up the “objective, measurable criteria” required under section 4(f)(1)(B).

4.2.1.1 Biological Recovery Criteria

The ESU, not a population, is the listed entity under the ESA. NMFS’ TRTs have identified the biological characteristics of viable ESUs as part of developing recommendations for delisting and recovery criteria. These biological characteristics are based on the collective viability of the individual populations, the populations’ characteristics, and their distribution throughout the range of the ESU. The population viability criteria are expressed in terms of risk of extinction over a 100-year time frame.

The PSTRT defined and recommended draft long-term recovery criteria for the Hood Canal summer chum ESU (Ruckelshaus et al. 2006), and the co-managers also did so, as described in the Plan, Chapter 2, and in this Supplement, Sections 3.4.1 and 3.4.2. The two sets of criteria, although not inconsistent, are based on different approaches. The PSTRT and co-managers will continue to work together to reconcile the co-managers’ interim goals for the eight stocks with the PSTRT abundance and productivity ranges for the two populations and the ESU. The Federal Register Notice (FRN) of the final plan will clarify the delisting criteria. The current discussion focuses on the PSTRT’s draft criteria, which were available at the time of this writing (Ruckelshaus et al. 2006).

ESU Viability Criteria

The PSTRT's viability criteria for the Hood Canal summer chum ESU are relatively simple, because the PSTRT has concluded that historically there were only two independent populations within the ESU. Summer chum salmon exist today in each of these two historical populations. Each population consists of several spawning aggregations (called stocks in the HCCC Plan) located in various rivers and creeks (Fig. 1).

The PSTRT concluded that the Hood Canal summer chum ESU would have a negligible risk of extinction if both of the historical populations of summer chum achieve a low risk (i.e., viable) status. "Viable" in this sense refers to a naturally self-sustaining population that has a negligible risk of extinction over a 100-year time frame. In practical terms, a population should have certain characteristics to be considered viable—sufficient numbers of naturally produced spawners and sufficient productivity (i.e. ratio of naturally produced and natural-origin juveniles per adult), life history, genetic, and ecological diversity, and distribution of fish throughout the watershed (see McElhany et al. 2000).

As noted in the Plan, the PSTRT found that summer chum salmon in the Hood Canal and eastern Strait are probably "a single metapopulation held together historically by a stepping stone pattern of demographic exchange" (Currens, *ibid.*), created by straying between adjacent streams. The PSTRT noted that because of the historical connectivity between subpopulations that spawned in Hood Canal and eastern Strait of Juan de Fuca streams, and gaps created by subsequent extirpations, it will be important to consider how to re-establish the links in order to maintain sufficient diversity and resilience at the stock and ESU level. The PSTRT has provided analyses that will be useful in refining strategies for recovering summer chum diversity at the ESU level (Ruckelshaus et al, 2006, pp 17-23).

Population Viability Criteria

The PSTRT has provided viability criteria for the two summer chum populations (Ruckelshaus et al. 2006); these criteria describe characteristics predicted to result in a negligible risk of extinction in the long term (100 years). The PSTRT considers the co-managers' interim stock recovery goals described in Section 3.4.2 of this Supplement compatible with these long-term criteria as appropriate short-term, interim targets. As stated previously, collaborative work will continue between the PSTRT and the co-managers to further evaluate and refine the PSTRT recommendations for ESU viability criteria.

Abundance and productivity: A population will have a low risk of extinction if it has sufficient abundance and productivity to withstand the natural variability in returns caused by environmental and anthropogenic factors. The PSTRT recommends a range of minimum viable population sizes, assuming at least 1:1 spawner/adult replacement and assuming that the populations maintain their spatial structure and diversity, i.e. that spawning takes place throughout the population's freshwater spawning range. The PSTRT used two methods of population viability analysis (PVA) for determining minimum escapement levels for which there would be less than a 5 percent probability of extinction in 100 years. The two PVA methods were based on different assumptions regarding expected summer chum spawner productivity

over time and under varying conditions. The recommended minimum ranges derived by the PSTRT using the first PVA method (“SimSalmon”) are from 13,000 to 36,000 naturally produced spawners for the Strait of Juan de Fuca population and from 25,000 to 85,000 for the Hood Canal population. The second method (“VRAP”) provided estimates of viability ranges in relation to potential harvest rates and relative to the current population status. The recommended minimum abundance ranges derived by the PSTRT using the VRAP method (assuming fisheries exploitation rates ranging from 0 to 30 percent and an intrinsic productivity for the populations of 4) are 7,100 to 8,000 naturally produced spawners for the Strait of Juan de Fuca population and from 10,900 to 11,600 for the Hood Canal population (Ruckelshaus et al. 2006).

The spawning escapement thresholds defined by the co-managers and adopted in the Plan as interim stock-level recovery goals (see Section 3.4.2 of this Supplement), when added together, fall outside or at the lower end of the viability ranges for the two populations generated by the PSTRT's population viability analyses. The PSTRT and co-managers will work together through the aforementioned collaborative process to review the data on abundance and productivity used to produce the population viability ranges and stock-level recovery thresholds, and to reconcile the different approaches. Final viability ranges for abundance and productivity for the Strait of Juan de Fuca and Hood Canal summer chum populations will be included in the final recovery plan for this ESU.

Spatial structure: A viable chum population contains multiple persistent spawning aggregations. The number of persistent aggregations needed for viability depends on the historical biological characteristics of the population and the historical distribution of spawning aggregations of the population. A population that meets the criteria below is likely to have a negligible risk of extinction over a 100-year period (i.e., be viable):

- Spawning aggregations are distributed across the historical range of the population.
- Most spawning aggregations are within 20 km of adjacent aggregations.
- Major spawning aggregations (spawning aggregations in rivers/creeks that have historically provided the most persistent habitat) are distributed across the historical range of the population and are not more than 40 km apart.

Both large and smaller spawning aggregations are important. Although it may not be necessary to reestablish spawning aggregations in all rivers and streams where they historically occurred, meeting these population viability criteria will require reestablishing spawning aggregations in some major rivers and smaller streams and creeks where they have been extirpated. Particularly in the early stages of population and ESU recovery, production of summer chum from smaller streams may provide important contributions to the health of freshwater, estuarine, and marine ecosystems and to the maintenance of the viability of the population while degraded habitats in larger rivers are recovering.

Further, the PSTRT notes that a viable population has spawning, rearing, and migratory habitats that function in a manner that is consistent with population persistence.

1) Conditions in the tributaries will affect the nearshore and estuarine environments into which they empty. Poor water quality and other habitat degradation can create inhospitable or stressful local conditions for summer chum salmon.

2) Spawning tributaries and their associated estuaries act as stepping stone habitats for migrating chum and affect the probability of successful dispersal and recolonization.

Diversity: Depending on the geographic extent and ecological context of the population, a viable population includes one or more persistent spawning aggregations from each major genetic and life history group historically present within that population (see also McElhany et al. 2000).

Conclusion

The Plan's interim recovery strategy for the initial 10-year period prioritizes (1) protecting and maintaining current subpopulations; (2) improving both tributary and nearshore habitat; and (3) re-establishing extirpated subpopulations. NMFS believes this strategy is consistent with longterm viability of the ESU. Further collaboration with the PSTRT will help to refine this recovery strategy during implementation and adaptive management.

4.2.1.2 Listing Factor (Threats) Criteria

Listing factors are those features that were evaluated under section 4(a)(1) when the initial determination was made to list the species for protection under the ESA. These may or may not still be limiting recovery when in the future NMFS reevaluates the status of the species to determine whether the protections of the ESA are no longer warranted and the species could be “delisted.”

NMFS proposes that, to determine that the affected ESU is recovered to the point that it no longer requires the protections of the ESA, the ESA listing factors should be addressed according to specific criteria identified for each of them so that delisting is not likely to result in re-emergence of the threat. It is also possible that current perceived threats will become insignificant in the future because of changes in the natural environment or changes in the way threats affect the entire life cycle of salmon. Consequently, NMFS expects that the ranking of threats will change over time and that new threats may be identified. During the periodic status reviews, NMFS will evaluate and review the listing factor criteria under conditions at the time.

The Plan describes potential threats in terms of harvest, hatcheries, habitat, ocean conditions, and climate change, and also considers cumulative effects from all of these factors. The HCCC staff provided Table 1 (see above in Section 3.5.1 of this document) summarizing limiting factors identified in the Plan and recommended actions by conservation unit and population.

Drawing from the Plan’s discussions and additional information from NMFS staff, NMFS is providing the specific criteria listed below for each of the relevant listing/delisting factors to help to ensure that underlying causes of decline have been addressed and mitigated prior to considering the summer chum salmon ESU for delisting.

NMFS expects that if the Plan’s proposed actions to address the threats and limiting factors are implemented, they will have a high likelihood of meeting the listing factor (threats) criteria specified here.

Factor A: The present or threatened destruction, modification, or curtailment of a species' habitat or range. Each of the threats criteria described below is related to one or more of the major factors limiting recovery described in the Plan and listed in NMFS' 2005 Report to Congress on the Pacific Coastal Salmon Recovery Fund (PCSRF) for Hood Canal summer chum salmon, i.e., (1) degraded floodplain and mainstem river channel structure; (2) degraded estuarine conditions and loss of estuarine habitat; (3) riparian area degradation and loss of in-river large woody debris in mainstem; (4) excessive sediment in spawning gravels; 5) reduced stream flow in migration areas; and (6) degraded nearshore conditions.

To determine that the ESU is recovered, threats to habitat should be addressed as outlined below:

1. Passage obstructions (e.g., dams, tidegates, and culverts) are removed or modified to restore fish access to historically accessible habitat to support region-wide recovery goals.
2. Channel function, including vegetated riparian areas, instream wood, stream-bank stability, off-channel and side-channel habitats, natural substrate and sediment processes, and channel complexity is restored to provide rearing, migration, and spawning habitat to meet the Plan's recovery goals.
3. Instream flow conditions that support salmon rearing, spawning, and migration needs and meet the summer chum salmon population targets are achieved.
4. Floodplain function and the availability of floodplain habitats for salmon is restored to a degree sufficient to support a viable ESU, including tidal swamp and marsh habitat in estuaries and the tidal freshwater portion of the lower rivers. This restoration should include connectedness between river and floodplain and the restoration of impaired sediment delivery processes and conditions affecting both estuaries and lower river reaches.
5. Deleterious effects of stormwater runoff are eliminated or controlled so as not to impair water quality and quantity in salmonid streams or the riparian habitats supporting them.
6. Agricultural practices are implemented to protect and restore riparian areas, floodplains, and stream channels, and to protect water quality from sediment, pesticide, herbicide, and fertilizer runoff.
7. Urban and rural development, including land use conversion from agriculture and forest land to developed areas, does not impair water quality or result in dysfunctional stream conditions.
8. Nearshore processes are protected and restored so that ecological inputs (of sediment, instream and groundwater flows, insects, leaves and wood) and ecological habitat processes support properly functioning estuary and nearshore habitat conditions, including eelgrass beds, drift cells, and mudflats, which in turn support summer chum salmon and the species they prey upon.
9. The effects of toxic contaminants on salmonid fitness and survival in the Hood Canal and eastern Strait of Juan de Fuca estuaries, lower reaches of streams and rivers, and nearshore ocean are sufficiently limited so as not to affect recovery.

10. Activities that dredge or fill in nearshore and river beds or harden stream banks are sufficiently mitigated.
11. Forest management practices that protect and restore watershed and stream functions are implemented on Federal, state, tribal, and private lands.
12. Technical tools accurately assess the impacts of habitat management actions.

For additional information on threats related to habitat, see Section 6 of the Plan.

Factor B. Overutilization for commercial, recreational, or educational purposes. To determine that the ESU is recovered, any utilization for commercial, recreational, scientific, or educational purposes should be addressed as outlined below:

1. Fishery management plans for salmon ESUs are in place that (a) accurately account for total fishery mortality (i.e., both landed catch and non-landed mortalities) and constrain mortality rates for individual populations to levels that are consistent with achieving ESU viability (i.e., provide for adequate spawning escapement given intrinsic productivity for populations and subpopulations representative of the life history and major regional divisions in the ESU); and (b) are implemented so that any effects on the abundance, productivity, diversity, and spatial structure of populations are consistent with the recovery of the ESU.
2. Technical tools accurately assess the potential impacts of fishery management actions.
3. Rules and regulations for fishery management actions are effectively enforced.

For additional information on threats related to harvest actions, see Section 4 of the Plan.

Factor C. Disease or predation. To determine that the ESU is recovered, any disease or predation that threatens its continued existence should be addressed as outlined below:

1. Hatchery operations in the region apply measures that reduce the risk that natural summer chum salmon populations are adversely affected by fish diseases and parasites.
2. The effects of harbor seal predation on Hood Canal summer chum salmon have been monitored for at least four years and results indicate that harbor seal predation may be a factor impeding recovery in some years at some sites.
3. Populations of introduced game fish are managed such that competition with or predation on summer chum salmon does not impede salmon population recovery.

For additional information on current threats resulting from disease or predation, see the individual conservation unit chapters of the Plan.

Factor D. The inadequacy of existing regulatory mechanisms. To determine that the ESU is recovered, any inadequacy of existing regulatory mechanisms that threatens its continued existence should be addressed as outlined below:

1. Regulatory mechanisms are in place to ensure that any effects on the abundance, productivity, diversity, and spatial structure of populations are consistent with the recovery of the ESU.
2. Technical tools accurately assess the potential impacts of regulatory actions.
3. Rules and regulations for habitat protection and restoration are effectively enforced.
4. Habitat conditions, watershed functions, and nearshore processes are protected and restored through land-use planning that guides human population growth and development.
5. Habitat conditions and watershed function are protected and restored through regulations that govern resource extraction such as timber harvest and gravel mining.
6. Habitat conditions, watershed functions, and nearshore processes are protected and restored through land protection agreements as appropriate, where existing policy or regulations do not provide adequate protection.
7. Adequate resources, priorities, regulatory frameworks, and coordination mechanisms are established and/or maintained for effective enforcement of land and water use regulations that protect and restore habitats and marine and freshwater water bodies and for the effective management of fisheries.
8. Regulatory, control, and education measures to prevent additional exotic species invasions are in place.

For additional information on existing regulatory mechanisms, see Section 13 of the Plan.

Factor E. Other natural or man-made factors affecting continued existence. To determine that the ESU is recovered, other natural and man-made threats to its continued existence should be addressed as outlined below:

1. Hatchery management plans are in place to ensure that any effects on the abundance, productivity, diversity, and spatial structure of populations are consistent with the recovery of the ESU.
2. Monitoring, evaluation, and research programs are implemented to assess the potential impacts of hatchery, habitat, and harvest management actions.
3. Rules and regulations for hatchery management and protection are effectively enforced.
4. Hatchery programs are operated in a manner that is consistent with individual watershed and region-wide recovery approaches; appropriate criteria are used for the integration of hatchery summer chum salmon populations and extant natural populations inhabiting watersheds where the hatchery fish return.
5. Hatcheries operate using appropriate ecological, genetic, and demographic risk containment measures for (1) hatchery-origin adults returning to natural spawning areas, (2) release of hatchery juveniles, (3) handling of natural-origin adults at hatchery facilities, (4) withdrawal of water for hatchery use, (5) discharge of hatchery effluent, and (6) maintenance of fish health during their propagation in the hatchery.

6. Hatcheries mark or tag all juvenile summer chum salmon so that they can be differentiated from natural-origin summer chum salmon in fisheries, migratory areas, and as adults returning to hatcheries and natural spawning areas.
7. Mechanisms are in place to reduce the incidence of, and impacts from, introduced, invasive, or exotic species.
8. Ecological functions of salmon, including their benefits in cycling ocean-derived nutrients into freshwater estuarine and nearshore areas, are considered in fishery, hatchery, and habitat management.

For additional information on threats related to hatcheries, see Section 5 of the Plan.

4.2.1.3 Application of the Criteria to Delisting Decisions

NMFS concludes that the Plan makes substantial progress toward defining objective and measurable criteria that, when met, would result in a determination that the species be removed from the list. It is understood that additional work will be done to refine and complete ESU-level viability criteria and to reconcile the interim stock-level goals accordingly. Based on this work, NMFS will confirm final delisting criteria in the final FRN for this recovery plan.

In accordance with our responsibilities under section 4(c)(2) of the Act, NMFS will conduct status reviews of Hood Canal chum salmon once every five years to evaluate the ESU's status and determine whether the ESU should be removed from the list or changed in status. Such evaluations will take into account the following:

- The biological recovery criteria (Ruckelshaus et al. 2006) and listing factor (threats) criteria described above.
- The management programs in place to address the threats.
- Principles presented in the Viable Salmonid Populations paper (McElhany et al. 2000).
- Co-managers' interim stock-level recovery goals.
- Best available information on population and ESU status and new advances in risk evaluation methodologies.
- Other considerations, including: the number and status of extant spawning groups; the status of the major spawning groups; linkages and connectivity among groups; diversity groups and the two populations; the diversity of life history and phenotypes expressed; and considerations regarding catastrophic risk.
- Principles laid out in NMFS' Hatchery Listing Policy (70 FR 37204, June 28, 2005).

The biological (4.2.1.1) and listing factor (threats) criteria (4.2.1.2), when taken together, describe conditions, commitments, and administrative measures that, when met, would result in a

determination that the species is not likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

4.2.2 Site-Specific Management Actions

The ESA requires a recovery plan to include site-specific management actions. NMFS believes the Plan meets this requirement.

As summarized in Table 3 of this document, the Plan provides an extensive program of site-specific actions to meet recovery objectives, including harvest management, hatchery supplementation and operational actions described in HGMPs, and habitat protection and improvements. These actions are detailed in the individual conservation unit chapters.

4.2.3 Time and Cost Estimates

Section 3.7 summarizes the estimates of time and cost required to carry out the measures needed to achieve the Plan's goal and to achieve intermediate steps toward that goal. Appendix D of the recovery plan (Costing of the Hood Canal Coordinating Council's Summer Chum Salmon Recovery Plan, August 2004) provides cost estimates to carry out specific recovery actions for the first 10 years of plan implementation. The cost estimates cover all capital projects judged to be feasible in the six conservation units, and non-capital work projected to occur over the 10-year period.

The Plan estimates that recovery of the Hood Canal Summer Chum ESU could take 50 to 100 years. NMFS supports the policy determination to focus on the first 10 years of implementation, with the proviso that specific actions and costs will be estimated before the end of this first implementation period for subsequent years to achieve long-term goals, and to proceed until a determination is made that listing is no longer necessary. Because of the impracticability of estimating all actions and costs over 50 to 100 years, NMFS agrees that 10 years is a reasonable period of time during which to implement and evaluate the actions identified in the Plan, to gain a preliminary view of the status and trends of important recovery indicators, and to make mid-course corrections as needed.

NMFS anticipates that as implementation of the Plan proceeds and as the various entities involved in recovery planning finalize their priorities for project implementation and sequencing, they will develop more explicit estimates of time and cost. NMFS expects that the HCCC will adopt a schedule for project completion and a revised budget for both capital and non-capital costs as part of plan implementation and adaptive management.

NMFS concludes that the Plan meets the third of the 4(f) requirements for a recovery plan: it includes estimates of the time required and cost to carry out the measures needed to achieve the Plan's goal and to achieve intermediate steps toward that goal.

4.2.4 Ongoing Programs and Actions that Support Recovery

NMFS recognizes that many of the management changes that have taken place in the recovery planning area within the last few years may benefit the ESU.

4.2.4.1 Habitat

Some habitat management actions that are already being implemented for recovery purposes are as follows:

- NMFS has approved two Habitat Conservation Plans (HCPs) and related ESA Section 10(a)(1)(B) incidental take permits for management of state and private timber lands that will gradually result in improved conditions on forest roads and riparian areas. The Washington State Department of Natural Resources developed, and NMFS approved, the State Lands HCP in January 1997. This HCP covers about 120,000 acres of State forest lands that drain into the area inhabited by the Hood Canal summer chum. Another recently approved HCP (June 2006) includes about 300,000 acres of state-regulated private timberlands in the same area. Including conservative management of the Olympic National Forest, forest management on the lands that affect this ESU will continue to provide more functional watershed conditions that support summer chum and other salmonids.
- The HCCC, as the designated Lead Entity for the Hood Canal watershed, coordinates ongoing salmon habitat restoration projects. HCCC is charged with the coordination of salmon recovery projects from counties, cities, conservation districts, Tribes, environmental groups, business interests, landowners, citizens, volunteer groups, regional fish enhancement groups, and other habitat interests. The Lead Entity is responsible for submitting habitat project lists to the Salmon Recovery Funding Board (SRFB) for its funding consideration. Other entities such as the U.S. Forest Service and the Skokomish and Port Gamble S'Klallam Tribes have also implemented a variety of salmonid habitat restoration projects throughout Hood Canal.
- Clallam County, the Jamestown S'Klallam Tribe, and the Dungeness River Management Team have been working toward restoration of the riparian corridor along the Dungeness River and Jimmycomelately Creek for several years.
- The HCCC's Community Nearshore Restoration Program (CNRP) is a combined education/outreach and restoration program for marine waterfront (shoreline) property owners and land managers. CNRP provides information about marine nearshore processes and ecosystem functions in marine "edge" habitats, and how anthropogenic disturbances impact those processes and functions. In pilot programs in the Northshore and Dewatto communities in Mason County, the HCCC has worked directly with shoreline landowners.
- Each of the four Counties (Mason, Jefferson, Kitsap, and Clallam) that encompass the range of the summer chum salmon ESU have completed or are in the process of developing a variety of land use regulatory programs. These programmatic actions include updates of Shoreline Master Programs and Critical Area Ordinances,

implementation of stormwater plans and facilities, exploration of landowner incentive programs for protection of salmon habitat, and implementation of zoning and land use designations that protect habitat.

- The HCCC is working with several existing entities to develop a coordinated approach to revegetating the marine shorelines of Hood Canal. Workshops, curricula, and training are designed for landowners and master gardeners to provide site-specific planting plans.

4.2.4.2 Harvest

Harvest management actions that are already being implemented for recovery purposes are as follows:

- Since 1999, the co-managers and NMFS have worked together on the development of a harvest management plan that would also address ESA goals. NMFS approved the plan in 2001 (61 FR 31600, June 12, 2001) as a plan contributing to the conservation of the ESU. The Hood Canal Recovery Plan incorporates this harvest management plan as its harvest strategy.
- Many of the harvest restrictions incorporated in the Base Conservation Regime defined in the harvest management plan have been initiated in recent years. Specific monitoring programs have been established to improve stock assessment methodologies as well as effectiveness of harvest management actions. These procedures include monitoring hatchery contribution to natural spawning populations, data collection of size and age of spawners, better assessment of the productivity of the various watersheds, evaluation of enforcement efforts.
- The co-managers have also implemented area, time, and gear restrictions that limit harvest opportunity on other salmon species to reduce impacts on listed summer chum. Among others, these actions include complete closure of most terminal fisheries, non-retention of summer chum, and gear restrictions (WDFW and PNPTT 2000). This management strategy is expected to result in, on the average, a 10.9 percent total annual harvest of Hood Canal stocks, and an 8.8 percent total annual harvest of Strait of Juan de Fuca stocks.
- Since the ESU was listed in 1999, Hood Canal summer-run chum salmon escapements have been stable or increasing for subpopulations in both regions, an apparent positive response to the decline in exploitation rates, in combination with other factors (PNPTT and WDFW 2004, WDFW and PNPTT 2005, WDFW and PNPTT 2006). Recent years' average escapements for all subpopulations have been above their critical escapement thresholds, although the Jimmycomelately subpopulation has been below its critical escapement threshold in one of the last three years. Exploitation rates since the adoption of the management plan have averaged 2 percent or less for all populations in the ESU except the Quilcene, which is initially managed in the extreme terminal area (Quilcene Bay and Big Quilcene River) on the basis of the forecast return and later (after about 50 percent of run is on the spawning grounds) on the basis of in-season escapement

estimates tied to escapement thresholds that define the level of exploitation. The Quilcene escapements have met or exceeded management targets every year since 1996. The overall pattern of low exploitation rates is anticipated to continue under the Base Conservation Regime.

- Although total exploitation rates have declined 90 percent since the early 1990s, Canadian fisheries accounted for more than 40 percent of the harvest of Hood Canal summer chum in the 1980s when exploitation rates were high. Exploitation rates in Canadian fisheries in recent years have been less than 1 percent. Much of this reduction is due to increased conservation efforts on Canadian salmon stocks and the significant reduction or elimination of coho salmon fisheries. Although these and other potentially influential fisheries are outside the jurisdiction of the U.S., the U.S. and Canada are parties to the Pacific Salmon Treaty. The Treaty establishes a framework for managing salmon stocks either originating from one country and intercepted by the other, or affecting the management or biology of the stocks of the other country. The Treaty commits the co-managers to equitable cross-border sharing of harvest, and conservation of U.S. and Canadian stocks.
- Much of the high harvest of Hood Canal summer-run chum in U.S. fisheries in the 1980s was also incidental to the catch of other salmon species, particularly coho. The level of harvest management actions taken by the co-managers for summer chum cannot be overstated. However, the reductions in exploitation rate were a result of both the explicit management for summer chum and, initially, significant reductions in coho fisheries as a result of conservation concerns for coho. It is important that fisheries continue to be managed for the needs of summer chum, even as the abundance of other salmon species improves and fisheries are adjusted to take advantage of those improving conditions.
- Because information on productivity has been lacking, management goals are based on historical patterns of observed escapement with the addition of conservation buffers. Managers update harvest objectives to be consistent with better information on habitat productivity and capacity as that information becomes available.
- Information on stock productivity and the contribution of hatchery spawners to the reproductive success of naturally spawning salmon populations is key to developing appropriate harvest management measures and objectives. Even more importantly, the information is critical in assessing the progress toward meeting all four of the viability criteria for naturally produced salmon: abundance, productivity, diversity and spatial structure. Monitoring and assessment of both stock productivity and hatchery contribution have increased in recent years and are key components of the state and tribal harvest management plan. Substantial new information is anticipated over the next few years as data become available from programs currently in place. However, these programs have been implemented only recently, information is still very limited, and many rely on uncertain future funding. To provide as complete and accurate an assessment as possible, data on productivity and hatchery contribution continue to be collected as part of an integrated monitoring program of harvest, habitat, and hatchery actions.

4.2.4.3 Hatcheries

Artificial propagation measures already in place are as follows:

- Prior to and after the 1999 listing of the ESU, the co-managers have implemented artificial propagation actions defined in the SCSCI (WDFW and PNPTT 2000) to preserve, rebuild, and reintroduce summer chum salmon populations and to reduce hatchery-related risks to natural-origin summer chum.
- Consistent with SCSCI requirements for summer chum programs, supplementation is used only when a summer chum stock is at risk of extinction, or to develop a broodstock in support of summer chum reintroduction to previously occupied habitats.
- Only the local, native fish are used as a broodstock source (except for reintroduction projects).
- All programs are limited to a 12 year (or three chum salmon generation) duration as a measure to reduce the risk of genetic diversity reduction in the propagated population.
- Operational standards have been applied to minimize impacts to natural salmon populations from potential hazards including: 1) partial or total hatchery failure resulting in a loss of summer chum that had been placed in the hatchery, 2) ecological effects from predation, competition, or disease transfer, 3) genetic effects from loss of genetic variability between or within populations, 4) effects from selection or reducing the population size of donor stocks, and 5) effects on other salmonid populations and species.
- Monitoring and evaluation plans specified in the Initiative are implemented to measure the effects of supplementation on the target stock and other summer chum populations.
- SCSCI risk reduction requirements for hatchery programs producing other species in the region have also been implemented. Actions implemented in Hood Canal and Strait of Juan de Fuca hatcheries producing fall Chinook, coho, fall chum, and pink salmon, and steelhead include: adjustments in juvenile fish release timings to avoid interactions with emigrating and rearing summer chum salmon fry; operation of broodstock collection weirs to minimize injury and mortality to migrating summer chum adults; termination of off-station release programs in summer chum streams; and compliance with intake screening and effluent discharge requirements at hatcheries to reduce the risk of harm to incubating and emigrating summer chum juveniles.
- Risk containment measures applied for hatchery programs in the region have benefited summer chum salmon abundance and distribution, and have likely reduced ecological and demographic risks posed by hatcheries producing other species to natural-origin summer chum since the time of listing (WDFW and PNPTT 2003a; PNPTT and WDFW 2004). For example, the risk of extinction was reduced from high to low for the Big Quilcene and Salmon Creek summer chum stocks following implementation of supplementation

programs that contributed adult summer chum to the natural returns and spawning populations. Natural-origin summer chum adult escapements to the Big Quilcene River in the four brood years prior to the 1992 initiation of supplementation actions by the co-managers (1988-1991) were 120, 1, 6, and 49 fish. Natural-origin summer chum adult escapements to the Big Quilcene River for the most recent four years (2001-2004) were 2,757, 2,836, 9,959, and 32,765 fish.

- Naturally spawning summer chum salmon aggregations have been reintroduced into vacant habitat formerly occupied by summer chum in Big Beef and Chimacum creeks. These reintroductions are initially considered to be range extensions of the donor Quilcene and Snow/Salmon stocks, further reducing their risks of extinction.
- Protective measures specified in hatchery plans approved by NMFS under the ESA will continue to be implemented into the future. However, implementation of one key requirement called for in the SCSCI - termination of supplementation and reintroduction programs after 12 years - means that the populations must eventually become self-sustaining in their natural habitats. Following this requirement, four of the eight summer chum hatchery programs originally authorized by NMFS under the ESA in 2002 (NMFS 2002a; 2002b) have now been terminated by the co-managers (Big Quilcene NFH, Salmon Creek, Chimacum Creek, and Union River). NOAA Fisheries made a determination for a continued threatened ESA listing status for the ESU in June 2005, given the need to secure viable, unsupplemented natural-origin populations and the habitat needed to sustain the populations without the benefits afforded by supplementation, for the foreseeable future.

4.2.5 ESA section 4(f) Conclusion

NMFS reviewed the Plan as well as the notes and conclusions of the PSTRT from its review of the Plan in May and July 2005. Based on that combined evaluation, NMFS concludes that the Plan meets the Recovery Plan requirements in section 4(f) of the Endangered Species Act, given the understanding that additional work will be done to refine and complete ESU-level viability criteria and to reconcile the interim stock-level goals accordingly.

5.0 NMFS' INTENDED USE OF THE PLAN

As a result of the evaluation of the Plan presented in Sections 3.0 and 4.0, and after considering public comment on the Plan and finalizing the supplement, NMFS intends to adopt it as the ESA recovery plan for the Hood Canal chum salmon ESU.

As noted above, NMFS prefers to rely on locally developed recovery plans to the extent possible. By endorsing a locally developed recovery plan, NMFS is making a commitment to implement the actions in the Plan for which we have authority, to work cooperatively on implementation of other actions, and to encourage other Federal agencies to implement plan actions for which they have responsibility and authority. We will also encourage the State of Washington to seek similar implementation commitments from state agencies and local governments.

5.1 ESA-Related Decision-Making

Recovery plans provide context and a technical foundation for NMFS decisions. NMFS will use completed plans to:

- Strive for an integrated approach to ESA section 7 consultations across all “Hs.”
- Judge the significance of proposed actions relative to the importance of the affected habitat and population for ESU survival and recovery.
- Inform ESA section 7 consultations, HCP review and approvals, and section 4(d) rules for proposed actions consistent with recovery plans.
- Evaluate the degree to which a proposed action is consistent with an applicable recovery plan in making ESA determinations.
 - Proposed actions that are consistent with an applicable recovery plan are more likely to be approved.
 - Proposed actions that are inconsistent with an applicable recovery plan will have an additional burden to demonstrate that they are nonetheless consistent with a determination of no-jeopardy or no-adverse modification of Critical Habitat.

Future regulatory reviews under sections 4(d), 7, and 10 of the ESA can be affected by this recovery plan. The Plan describes the most important limiting factors and threats facing the ESU as well as the greatest opportunities for improving survival across the Hs. This information will provide important context for evaluating the effects of actions subject to sections 4(d), 7, and 10 in the region of Hood Canal and the eastern Strait of Juan de Fuca. Recovery plan information that should aid these evaluations includes: descriptions of independent populations; viability criteria for abundance, productivity, diversity and spatial structure; limiting factors and threats; and geographic and temporal context for considering risks and for prioritizing recovery actions.

Future section 7 consultations can also be informed by recovery plans because Federal programs will need to incorporate the technical assessments completed by non-Federal entities. For example, biological assessments for section 7 consultations in any given watershed would benefit from incorporating technical information from the conservation unit sections of the Plan.

Section 7 consultations could also be strengthened by recovery plans as a result of more effective use of section 7 conservation recommendations. The Federal agencies should anticipate that significant improvements in survival are needed to recover listed ESUs. Section 7(a)(1) states that the Federal agencies shall, in consultation with NMFS, utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of listed species. NMFS expects to use the advisory tool of section 7 conservation recommendations to encourage Federal conservation programs.

5.2 Priority Setting

- Recovery plans help focus funding and other efforts on priority areas and actions that must be performed first to achieve recovery. NMFS has recommended to states and tribes that PCSRF funding requests should be consistent with recovery plans.
- NMFS will prioritize permitting for actions implementing recovery plans and for actions that are consistent with recovery plans.
- Recovery plans will improve cost effectiveness by identifying priorities and by setting up credible adaptive management frameworks.

5.3 Changes Incorporated Over Time

NMFS expects that in response to public comments received on the Plan and through the adaptive management process, additional actions, or clarifications of existing actions, may be incorporated over time.

5.4 Further Public Process

NMFS collaborated with the HCCC in the recovery planning process. Publication of this Supplement for public review and comment initiates NMFS' formal administrative process. In accordance with NMFS' Endangered and Threatened Species Recovery Planning Guidelines (55 FR 24296, NMFS 1990), NMFS is publishing a Notice of Availability (NOA) of the HCCC's Draft Summer Chum Salmon Recovery Plan. Concurrent with NMFS' publication of that notice, the agency is publishing this Supplement to the Draft Summer Chum Salmon Recovery Plan.

NMFS is publishing the NOA and Supplement for 60 days, as specified in NMFS' Interim Endangered and Threatened Species Recovery Planning Guidance (NMFS 2004e). NMFS will summarize the comments received and provide responses in a subsequent Federal Register notice.

The recovery planning guidelines state that information obtained through public comments should be addressed and incorporated throughout the final recovery plan as appropriate. Upon completion of the public review process and incorporation of the necessary updates to the Plan, NMFS intends to approve a final recovery plan for Hood Canal and eastern Strait of Juan de Fuca summer chum salmon. NMFS will publish a NOA of the final plan or plan Supplement at that time.

All Plan materials can be found at the NMFS website at <http://www.nwr.noaa.gov/Salmon-Recovery-Planning.cfm> and the HCCC website at <http://www.hccc.wa.gov/SalmonRecovery/default.aspx>

Printed versions and compact discs will be available at public locations also listed on the HCCC website.

6.0 ABBREVIATIONS

BCR	Base Conservation Regime
ESA	Endangered Species Act
ESU	evolutionarily significant unit
GMA	Growth Management Act
HCCC	Hood Canal Coordinating Council
HCP	Habitat Conservation Plan, associated with ESA section 10(a)(1)(B) permits
HGMP	Hatchery and Genetic Management Plan
Hs	Habitat, harvest, hatcheries, hydropower
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
PCSRF	Pacific Coastal Salmon Recovery Fund
PNPTT	Point No Point Treaty Tribes
PST	Pacific Salmon Treaty
PSTRT	Puget Sound Technical Recovery Team
RMP	Resource Management Plan
SCSCI	Summer Chum Salmon Conservation Initiative
SMA	Shoreline Management Act
TRT	Technical Recovery Team
USFWS	U.S. Fish and Wildlife Service
VSP	viable salmonid population
WDFW	Washington Department of Fish and Wildlife
WRIA	Watershed Resource Inventory Area

7.0 REFERENCES CITED

- Cooney, Rosie. 2003. The Precautionary Principle Project: Sustainable Development, Natural Resource Management and Biodiversity Conservation. IUCN 3-IC Project Situation Analysis. December. 32 p.
- Correa, Ginna. 2002. Salmon and Steelhead Habitat Limiting Factors. Water Resource Inventory Area 17. Quilcene-Snow Basin. Washington State Conservation Commission. Final Report. November 2002. 316 p.
- _____. 2003. Salmon and Steelhead Habitat Limiting Factors. Water Resource Inventory Area 16. Dosewallips-Skokomish Basin. Washington State Conservation Commission. Final Report. November 2002. 257 p.
- Currens, Ken. 2004. Identification of independent populations of summer chum salmon and their recovery targets. January 29, 2004, draft document. Northwest Fisheries Science Center. NOAA Fisheries. Seattle, Washington. 18p. [Also listed as PSTRT 2004]
- Good, T.P., R.S. Waples, and P. Adams (editors). 2005. Updated status of federally listed ESUs of West Coast salmon and steelhead. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-66, 598 p.
- Kuttel, Jr., Michael. 2003. Salmon and Steelhead Habitat Limiting Factors. Water Resource Inventory Areas 15 (West), Kitsap Basin and 14 (North) Kennedy-Goldsborough Basin. Washington State Conservation Commission. Final Report. June 2003. 312 p.
- Johnson, O.W., W.S. Grant, R.G. Kope, K. Neely, F.W. Waknitz, and R.S. Waples. 1997. Status review of chum salmon from Washington, Oregon, and California. U.S. Dept. Commerce, NOAA Technical Memorandum. NMFS-NWFSC-32. 280 p.
- Lestelle, Lawrence C., Gregory R. Blair, and Lars E. Mobrand. 2005. Assessment of Summer Chum Performance in Hood Canal and the Eastern Strait of Juan de Fuca in Relation to Habitat Conditions and Strategic Priorities for Recovery and Conservation Actions. March 2005. Submitted to the Hood Canal Coordinating Council. Mobrand Biometrics, Inc. 61 p.
- May, Christopher and Gretchen Peterson. 2003. East Jefferson County Salmonid Refugia Report. 244 p.
- McElhany, P., M. H. Ruckelshaus, M. J. Ford, T. C. Wainwright, E. P. Bjorkstedt. 2000. Viable salmon populations and the recovery of evolutionarily significant units. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-42, 156 p.

Montgomery, D.R. ed. 2003. Restoration of Puget Sound Rivers. University of Washington Press, Seattle, WA. 505 pp.

National Marine Fisheries Service (NMFS). 2002a. NMFS determination that four Washington Department of Fish and Wildlife HGMPs meet all of the criteria under Limit 5 of the ESA 4(d) Rule for the Hood Canal Summer-Run Chum Salmon ESU, 50 CFR 223.203 (July 10, 2000; 64 FR 42422). March 4, 2002 letter from D. Robert Lohn, Regional Administrator, NMFS NWR to Jeff Koenings, Director, Washington Department of Fish and Wildlife. 3 p.

____. 2002b. NMFS determination that four U.S. Fish and Wildlife Service HGMPs meet all of the criteria under Limit 5 of the ESA 4(d) Rule for the Hood Canal Summer-Run Chum Salmon ESU, 50 CFR 223.203 (July 10, 2000; 64 FR 42422). March 4, 2002 letter from D. Robert Lohn, Regional Administrator, NMFS NWR to Anne Badgley, Regional Director, U.S. Fish and Wildlife Service. 3 p.

____. 2002c. Endangered Species Act section 7 consultation and Magnuson-Stevens Act essential fish habitat consultation. Biological opinion on artificial propagation in the Hood Canal and eastern Strait of Juan de Fuca regions of Washington state. Hood Canal summer chum salmon hatchery programs by the U.S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife and Federal and Non-Federal hatchery programs producing unlisted salmonid species. Sustainable Fisheries Division, Northwest Region, National Marine Fisheries Service. Portland, OR. 277 p.

____. 2003. Northwest Fisheries Science Center and Southwest Fisheries Science Center. West Coast Salmon Biological Review Team. Updated status of Federally listed ESUs of West Coast salmon and steelhead. July 2003

____. 2004a. Artificial Propagation Evaluation Workshop Report. NOAA Fisheries, Northwest Region, Protected Resources Division. May 18, 2004. Available on the internet at: www.nwr.noaa.gov/1srd/Prop_Determins/

____. 2004b. Joint state tribal resource management plan provided by the Washington Department of Fish and Wildlife and the Puget Sound Tribes for salmon fisheries affecting Hood Canal summer chum salmon under limit 6 of the 4(d) rule - evaluation and determination. Sustainable Fisheries Division. Northwest Region. NOAA Fisheries. Seattle, Washington.

____. 2004c. Salmon Recovery Division report -Hood Canal summer chum salmon ESU. April, 2004. Salmon Recovery Division, NOAA Fisheries. April, 2004. Lacey, Washington. 13p.

____. 2004d. Supplement to the Environmental Assessment Prepared for a National Marine Fisheries Service Action to Determine Whether Eight Hatchery and Genetic Management Plans Provided by the Washington Department of Fish and Wildlife and the U.S. Fish and

Wildlife Service Meet the Criteria in the Endangered Species Act Section 4(d) Rule Limit 5 (50 CFR 223.203(b)(5)) – Tahuya River Reintroduction Component Update. Salmon Recovery Division, NOAA Fisheries. Lacey, Washington. 27p.

_____. 2004e. Interim Endangered and Threatened Species Recovery Planning Guidance. Silver Spring, MD. October 2004

_____. 2004f. Salmon Hatchery Inventory and Evaluation Report (SHIER) for Chinook salmon hatchery programs within the geographic boundaries of the Puget Sound Chinook salmon ESU. Hatcheries and Inland Fisheries Branch. Salmon Recovery Division. NOAA Fisheries Service. Lacey, Washington. 102p.

_____. 2005a. Northwest Region. 2005 Report to Congress: Pacific Coastal Salmon Recovery Fund FY 2000-2004. Hood Canal Summer Chum Salmon – Recovery Needs. July 2005.

_____. 2005b. Salmon Recovery Division report - Hood Canal summer chum salmon ESU. Tim Tynan, Puget Sound Region Biologist. Updated January 3, 2005. Salmon Recovery Division, NOAA Fisheries. Lacey, Washington. 13p.

National Marine Fisheries Service (NMFS), United States Fish & Wildlife Service (FWS). 2005. Draft Environmental Impact Statement for the Proposed Issuance of Multiple Species Incidental Take Permits or 4(d) Rules Covering the Washington State Forest Practices Habitat Conservation Plan. Appendix A, Regional Summaries (first 82p.)

National Research Council (NRC). 1996. Upstream: Salmon and Society in the Pacific Northwest. Report of the Committee on Protection and Management of Pacific Northwest Anadromous Salmonids for the National Research Council of the National Academy of Sciences. Washington D.C. National Academy Press. 389 pp.

Point No Point Treaty Tribes (PNPTT) and Washington Department of Fish and Wildlife (WDFW). 2003. Summer chum salmon conservation initiative – an implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca region. Supplemental report No. 5. Report on summer chum salmon interim recovery goals. Washington Department of Fish and Wildlife. Olympia, Washington. Washington Department of Fish and Wildlife. Olympia, Washington.

_____. 2004. 2003 Progress Report on Hood Canal Summer Chum Salmon. September 9, 2004 transmittal to Susan Bishop and Keith Schultz, Sustainable Fisheries Division, NOAA Fisheries. Seattle, Washington. 22p.

Puget Sound Technical Recovery Team (PSTRT). 2004. Identification of independent populations of summer chum salmon and their recovery targets. Ken Currens January 29, 2004 draft document. Northwest Fisheries Science Center. NOAA Fisheries. Seattle, Washington. 18p.

- Roni, P. editor. 2005. Monitoring stream and watershed restoration. Amer. Fish. Soc., Bethesda, MD. 350 pp.
- Ruckelshaus, M.H., K. Currens, R. Fuerstenberg, W. Graeber, K. Rawson, N. J. Sands, K.J. Scott. 2003. Integrated Recovery Planning for Listed Salmon: Technical Guidance for Watershed Groups in Puget Sound. Puget Sound Technical Recovery Team.
- Ruckelshaus, M.H., N.J. Sands, K. Rawson, K. Currens, R. Fuerstenberg, W. Graeber, J. Scott. 2006. Hood Canal Summer Chum Viability White Paper, Draft available from Puget Sound TRT upon request. May 5, 2006
- Simenstad, C.A., K.L. Fresh, and E.O. Salo. 1982. The role of Puget Sound and Washington coastal estuaries in the life history of Pacific salmon: an unappreciated function. Pages 343-364 in V.S. Kennedy, editor. Estuarine Comparisons. Academic Press, New York.
- Spence, B. C., G. A. Lomnický, R. M. Hughes, and R. P. Novitzki. 1996. An ecosystem approach to salmonid conservation. Funded jointly by the EPA, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. TR-4501-96-6057. Man Tech Environmental Research Services Corp., Corvallis, OR.
- Washington Department of Fish and Wildlife (WDFW). 2004. Stream habitat restoration guidelines. Washington State Aquatic Habitat Guidelines Program.
- Washington Department of Fish and Wildlife (WDFW) and the Point No Point Treaty Tribes (PNPTT). 2000. Summer chum salmon conservation initiative – an implementation plan to recover summer chum in the Hood Canal and Strait of Juan de Fuca region. Fish Program, Washington Department of Fish and Wildlife. Olympia, Washington. 424p. plus three appendices.
- _____. 2003a. Summer chum salmon conservation initiative – an implementation plan to recover summer chum in the Hood Canal and Strait of Juan de Fuca region. Supplemental report No. 3. Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca region. Washington Department of Fish and Wildlife, Olympia, Washington. 123 p.
- _____. 2003b. Summer chum salmon conservation initiative – an implementation plan to recover summer chum salmon in the Hood Canal and Strait of Juan de Fuca region. Supplemental report No. 4. Report on summer chum salmon stock assessment and management activities for 2001 and 2002. Washington Department of Fish and Wildlife. Olympia, Washington. 219p.
- _____. 2005. 2004 progress report on Hood Canal summer chum salmon. Memorandum to NOAA Fisheries Service and the Puget Sound Technical Review Team. February 10, 2005. Fish Program. Washington Department of Fish and Wildlife. Olympia, Washington. 15p.

_____. 2006. 2005 progress report on Hood Canal summer chum salmon. Memorandum to NOAA Fisheries Service and the Puget Sound Technical Review Team. March 1, 2006. Fish Program. Washington Department of Fish and Wildlife. Olympia, Washington. 18 p.

Washington Governor's Salmon Recovery Office (WGSRO). 2004. 2004 state of salmon in watersheds report. State of Washington Governor's Salmon Recovery Office. Olympia, Washington. 67p.